Case B
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R: #00:04:42-2# I have several questions today. The first one is what's the dominant design approach of this project? like User-center design or contextual design?

P: #00:05:05-5# Alright, so it would definitely, broadly fall into the category of contextual design. However, I would say from my first definition, it was more related to you know, something to do with like, in my case, the user was the system, not really like a human user in a way.

R: #00:05:32-5# so the user is a system?

P: #00:05:36-5# It's a system. I mean it's not a technical system, it's a health system. So what I mean is, system has people and process, and the people and process are the same in my case because I cannot change people in rural health centers, nor I can change the process that have a reporting mechanism. So my design was to fit into the existing system, and hence I would call it a more...I don't have a name for it, but it is contextual design, but it is specifically for the system when user is the system, and not really like the end user as a human being.

R: #00:06:21-4# ok, so I cannot say user center design is a principle of this project, but it's a contextual design.

P: #00:06:35-9# Yes.

R: #00:06:41-9# So if contextual design is a the design principle, how did your team do that?

P: #00:07:03-1# Right, it is very important in order to follow contextual design to first step being to understand the context very well. If they do not understand the context, we cannot design or we cannot solve the problem. So the first thing is, I didn't define the problems and understanding the context. What does context mean? So context means a lot things, it means what is happening around. So if you consider a system, there is a system with a boundary, and there is internal context and there is external context. I 'm going to a scientific definition, but a system could be influenced by external factors which could be beyond our control, and internal factors which are not on our controls but the system control. So it is very important to identify and understand those constraints so that we know what we are working with. So in my case in the [the name of the product], when we carried out our study and exploration in terms of what kind of design would fit in, we first study the internal process. So we follow the process that was recommended by the health authorities, which is recommended by the government.

R: #00:08:31-7# sorry, what process?

P: #00:08:33-7# So the government or the health authorities already had an existing reporting mechanism. I will give an example of the paper-based reporting mechanism that they already have. But the only problem is that it is based on paper, and it takes like 2 or 3 weeks to report the disease cases. So it's not a very efficient process. So now we understood that there is a process in place, but the process is flawed with the sense it's not efficient. So what do we need to do? Our problem in statement should be how to improve the process. I didn't want to replace

the process. Because if you replace the process, that means you are to retrain the professionals, you are to retrain a lot of people, etc. So my aim was only to make the process more efficient. So understanding the constraints, and other constraint was...because the system was suppose to work with health centers (Which means working with)between the government and other officials. So my constraint was how can I work with them? Because convincing them to dig up a new sort of solution is a big big thing. And designers have their own limitations. So if I compare my skills and what I can do with the process, I have to find a match, which is I can only do something that would improve the process. I do not have the skills or the power to change decisions of the health authorities, I 'm not in the position to do so. So understanding contexts, and then matching your skills with the contexts. So what can you contribute to the contexts is very important. The third thing is basically, So it's like designing with the user, in this case, is designing with the system. So I have to interact with many parts of the system including people at different levels and also the process, so that I can create a very compatible solution, and a solution that people can use very easily.

R: #00:10:50-5# So can I conclude that there are three aspects of contexts. The first one is different level of people who will use the system, and the second one is there is an existing health reporting system or process, and the third one is you don't have the power to change the system. Is that right?

P: #00:11:33-7# No, the third point I think so what I meant to say was when I design the system or when I was creating the system. See, every designer has a certain set of skills. A very simple example would be, someone is an interaction designer, or someone is an industrial designer, but a necessary skill of every designer is to communicate his designs in such a way, you know, you convince someone to use your designs. So that is a skill, but that is in a sense that after that, you know, like influencing a policy, or taking some kind of policy decision are not really a skill set of a designer at least in this context. So I can influence the people to use my system, but I cannot change the process because it requires a brutal critic (process) moment, which means I have to go really high up, maybe talk to the health minister, and the minister will say to the state minister, and then the state minister will say to the restrict health officer, and then it goes from top to bottom. It is a typical government brutal critic process. Obviously, because of the time constraint and rather the skill constraint, I would not like to go on that part, because it's more of a political thing rather than anything could solving the problem by using design.

R: #00:13:24-7# ok, so this is a political thing.But the reporting system and the reporting process is the same thing, right?

P: #00:13:54-2# Yes, they do have, and that's why [the name of the product] was meant to make that process more efficient.

R: #00:14:02-6# ok, can we go into the details of the design process? I'd like to know how each design stage follow the dominate design approach, which you said it is contextual design.

P: #00:15:01-4# ok, so let's start from the beginning, we started with a very brief user study, so we did have one thing that is clear that we want to explore the possibility of using the mobile technology in health care. And especially from the secondary research, that is like some online research, we shortlist at some areas that are relevant to India, and one of the areas was this whole issue with tracking the spread of disease. So we had that in mind, but that was it. That was a very broad sort of area we wanted to look in, we did not have any solutions in mind. So when we did this study, we first understood the context. Does it really make sense to do this? and do we really need to do this? Because what happens many times is, the information that is

available online might influence or excite you, like, ok, this is a very interesting area, and maybe we should design something within this area. But when you actually go to the ground and see there are already (installed) some systems working. It's just that maybe these systems are not working efficiently. So it's not that is the absence of a solution. The solution is there. But this solution might be a misfit or might be very slow. The challenge become very different in the sense that there is already a process. And that's why I said it is very important to understand the context. Because when we went there, we found that there is already a process. So we cannot design based on what we think, we need to design based on what the process is. Because if you design too far away from the process, it will not be adopted or accepted very easily. So that was our constraint. So when we went to the ground and met all these people, we actually got to know what are our boundaries. In what boundaries we have to design. And it is very important for us to consider the constraints because without the constraints we cannot really design anything unless you are doing your masters of PhD, maybe we can think of anything, but I 'm talking about real users. So that was very important. And after the first user study, we identify opportunities where we can have some kind of design interventions. And then we proposed some interventions, and internally, that is we discuss on ourselves. And then we propose them to our partner university, that is the medical school. Because they are knowledge experts, we being designers from design and technology background in terms of [the name of the company] as a company, we do not have expertise in, you know, what is good in health care and what is not. So we wanted their opinion. Then we finalize that ok, Malaria is a very important and critical sort of disease that occurs every year in India, and we can actually make a design intervention in this area so that we can test the system effectively in real world. So that was our main motivation. And after we decided that, we conceptualized a system in terms of input, management that is analysis, and then the output. So these are the three major conceptual pillars of our system. So input from our point of view was not very complicated because we knew that if the health workers have to use it, it has to be very very simple. So our constraint was to design a very simple input mechanism, and that's why our UI was just one screen UI. There was no flow in the UI. So that was the proposal. Analysis, I will talk about it later. And then the last part was the output, which was very important for us because one of the fundamental hypothesis was that if we create a system that help the doctors on the field to see the information in real time, then they can make quick decisions and the preventive measures of stopping the spread of Malaria. So what could be the preventive measures in real world, if the doctors know that is Malaria in this area, they would take steps like a fumigation, which means they fumigate all the green blown sustanon water so that the already existing mosquitoes they would die because of the poison of smoke. They would also have interventions of awareness that is, they will go from village to village, and then they will spread medical awareness in terms of like a group meeting, where they call everyone and say, ok, please do not keep waters stagnant. If that is a water stagnant near your house, you know you put some medical powder or you must ensure that your kids are protective from the mosquitoes, use a mosquito net and things like that. So this kind of awareness or information of awareness is there. So these are the preventive measures. And the other measure is called curative measures, which means Malaria is already existing, and the doctors need to control it. So there is a timeframe of seven days in which Malaria could be controlled if the doctor knows it in time. So either the doctor can take preventive measure, but if already the Malaria has infected a lot of people, then they have to quickly act and take curative measures. So more of time-sensitive. And our hypothesis was that if fit design or output in such a way, then doctors can understand these information very easily. Then they can use these information to act very fast. Either to do preventive measure or to do curative measure. So that was our philosophy in that time. And that's why, I don't know if you have seem those visualizations of map and graph and things like that. So that was we wanted to simplify the information because in the existing process, we found that all these information is available only in from of numbers. And wherever that are visualizations, informal simple chart,

they are actually done by hand on a piece of paper. Which means they photocopy that paper and then send it to all the doctors, which is again so time consuming. It's not really a practical solution. So that was designing with the context. And also, when we went in the field, and the first iteration that we made, what we did was, we created a very low fatality flash prototype on the device. And we shared them with the doctors. What we did was we gave them hypothetical scenario that, if there is Malaria in this particular area, these are the 3 or 4 different ways in which we were like to visualize these information. So from a medical point of view, which visualization do you think makes more sense and you can use very easily. So in the philosophical logic, which is the tracking this kind of disease and predicting the patterns of a current disease that are already visualizations that are used in a common health care practice. So we compared them with ours, and basically we found a good visualization which works for the medical professions, which is this geo-visualization of map and simple graphs in it. So that was, I would say designing in context and with the system. Because if they use visualization that are really cool, but does not makes sense to medical professionals. It's of no use. So that was part of designing within the context. And finally when we did the deployment, we had to make some minor tweaking. So one realization that sort of, you know when I think of it now after maybe you know 2 years or so, is no matter how much time you spend initially in the user study, there is always something very important that can only be realized or understood when you are actually deploying the system. So in a long term project like this, when we have to create the system and test it in real world, so not just doing a usability evaluation, but actually trying the whole system in real life for a couple of months. That's a huge challenge. And when you do that, there are some really important things that come up, and what I am saying was one of the visualizations that we initially taught and even the medical professionals said that it is fine. One was in terms of, Yeah I would like to highlight the input part of it actually. So initially we taught that we would use local language so there are 2 mechanisms. One is the visual form, which you can see as a GUI on your form. But there is another way that is an IVR, like interactive voice response system. And we designed that IVR in 2 languages, English and the local language. And what I mentioned from the user study was that, because the health workers do not have so much knowledge of English. They will be more comfortable with IVR system which is in local language than the English system, or even the GUI system. But it termed out to be that the most popularly used system was actually the English GUI. So one of the reasons that we didn't really realize or consider is that the function knowledge of English in medical field was relatively high. Which means for example, there is a disease that is reporting, everything is done in the local language, but there are certain medical things which are to reported in English. So there is no equivalent local language translation for that. So like Malaria is always Malaria, there is no local language for Malaria, things like that. And that's why users or the end-users felt very comfortable using that English GUI than the local language thing, because local language sounded very abnormal to them, not something that they are familiar with. So things like that always come up when.....I would say there is no end to design. We could have even done better if we spend more time on the field testing the system. But we have to stop somewhere because one of the biggest challenges of evaluating or a pilot, the system is you should stop evolving the system at one point so that you can compare at a later stage. So when we define a starting point, we must stop the further development, the further changes of the system, so the system remains constant and you can compare from the starting point to the end point. So our end point was, we designed a system which has multiple input mechanisms, and which has multiple output mechanisms. And we don't evolve or change the system after that. So the deployment starts, what we had to do, we did, and then it was the time of evaluation. So even in evaluation, we found there are some issues within the system in terms of design. However, we documented that, but we never change the system. Because in a standard evaluation process, there is always in the first few days or weeks, there is always these whole emotional response to a new system that is, you know some people are quite excited about it, some people are a bit of

scared, some people are skeptical. So all this influences the feedback that we get, and as responsible designers, we cannot change the system just based on the initial feedback. We must think 2 steps back and observe the behavior of the people and the system in a longer period of time, so that we can really find out what is going on. So in terms of designing in context, I would like to emphasize that the initial input that we get has to be taken with a picture of thought. It cannot be literally translated into design even though the users might give a very strong feedback, but we must wait for sometime to let the feedback or let the system behavior sort of you know bring to some level of maturity. And then you know, reevaluate. So pause is one of the important things we need to do in design, that is you must pause and see what happens. Not just keep on changing depending on what the user says.

R: #00:30:18-3# I really like your explanation and I lean some many things. Ok, you mentioned 2 personal life experience in our last interview. One is your experience of trust in your childhood. So I'd like to know, when did you or at which design stage did you incorporate this experience into your design?

P: #00:32:15-6# Sure, so, I would like to clarify that the incorporation of this experience was not really planned. I wasn't like thinking, oh, I felt sick in my childhood, and I would like to use that experience to do this design. It was never like that. The connection sort of came up when I was in the field. So it was I guess after the first study and then we proposed some solutions. And our first job was to meet the experts in the university to evaluate these initial designs. And this is again a very personal thing, I know there is a standard design process, but in my personal understanding, I talked that the experts are making decisions for the end-users because experts were experts, and not really the end-users. They are part of the end-users, but they are not the health workers, they are not the doctors on the field. So at some point, I realize that these guys provide expertise from a medicine or health care policy perspective. But because they are not the users, I must go to the users to understand what their expectations are from the system. So there are 2 layers of any system, one is the prescribe layer of what your boss or what the superior states. So in [the name of the product], reporting the disease was a professional requirement. So this is what their bosses are convinced that everyone must do. But the second layer is the more human or personal layer, so how can you motivate someone to input the data at the end of everyday. And how can you motivate all the doctors so that they will use this data efficiently. Because otherwise, what will happen is, some people will use this and some people won't. And what are the reasons for that? So at that time, it sort of stuck me that this whole creating and making a pretty good relationship between humans and humans, that is the health workers and the doctors, and also the system and the users. These are 2 important aspects of the system. And at that point, because I was staying there in these villages with the doctors. That's when I at one point, sort of I went back to my... you know I was talking to one of the doctors about different diseases, and then we came up with this kind of conversation of Typhoid. And that's when I remember when I had Typhoid, and I was really really sick. This is what had happened, and that's why I realized that trust is very important and I must ensure that some aspects of this trust billing and trust maintenance are used in this whole design process. So one of the ways in which it manifested was the use of the data. So how can we use the data to create a notion of trust? right?

P: #00:35:54-6# So let's go deeper into what is trust. Trust means an expectation from mortal parties which meet similar goals. So I expect that you will behave in a certain way, and that's how I say I trust you. So for example, we are talking right now and I am telling you so many things. So I trust you if only use it for your research. I trust that you won't find a fortune for it, right? It's a trust. So that's my expectation. And similarly you also trust me on certain things, so we don't say but we have a certain expectation from each other. And that is sort of

communicated by you know this multiple calls that we had. So after every call, the trust level goes higher or down depending on our interactions, right? So let's say if I avoid your calls 10 times, then maybe you will start thinking maybe [the name of Designer 3] is not interested or something, which means your trust on me would go down. So if you compare that to what I did in the [the name of the product] system, is the initial acceptance or the initial experience with the system must be in such a way that it creates trust. And then the job is relatively easy in terms of maintaining the trust. How do you maintain trust have regular interactions. Any system which does not give feedback will lose trust over a period of time, so trust is a function of time in certain sense.

R: #00:37:42-3# so trust is a function of time and interactions?

P: #00:37:48-4# Yes, trust is a function of time, interactions and expectations. so in my system, the idea was the health worker will report disease. Let's say the scenario is, Day 1, [the name of the product] reports 2 positive cases of Malaria, and 10 cases of fever. He reports the system, right? But what if he never gets a response for that? Then he will think, "Hey, I have been reporting these cases everyday, and I don't get a response". So what is the use of this whole thing, it's like I am giving efforts, but there is nothing happening. Similarly, if you look from doctors point of view. Doctors do not report any of the disease, they just look at the data. So everyday they look at the data, and if that is their own data, it's like "Oh, yeah, I can see my health centre have 50 cases of Malaria, but they already know it, my health worker who comes back from the village every evening. He can just coming to my office and tell me, there are 5 number of Malaria cases or 2 number of Malaria cases, so why do we really need to use the system?" And hence this whole rationale sharing information among peers, so [the name of the product] allows the data of not only that B&C, but neighboring B&C and maybe the follow the B&Cs to be share among each other. So which means that a doctor in location A can know what is happening in location B, and can know what is happening in location C. Now in our case what happen was, the doctors that came in the red zone for example, once they realized they are in red zone, they started communicating with their neighboring doctors, and also the authorities. That means we translated an information visualization into a real world of realize communication. And when they started talking, so first thing initially, everyone is skeptical about the new system. Is these information correct or not? right? because it's a very new system. So in [the name of the product], same thing happen, they were not sure whether this is the right system or not, or the right data. So when a doctor who is in the red zone called a doctor in the green zone who is his neighboring doctor, and then communicated that, yes, there are the cases, what you think is right and the data is really correct. Hence, there is this initial trust, ok, I trust the system now, I trust my other doctor because he confirms this. So you trust the source and then you trust the...I wouldn't call it an information, but I don't what's the right word. It's not even in the context. But it's something like a context, so you trust the reality and you trust the source of that reality in a way. So that happen and similar interactions happen among health workers and the doctors, which means they validated the system that the system is right, and whatever they are doing is not only now relating to their own health centers, but now people in other health centers are using this information to deal with own issues. and hence the level of trust increases. And this is a very near real time system, which means the data is available on a very regular basis, which translates into regular interactions. Which means the trust remains that it might increase or decrease, but it never dies, because interactions keep things going on. And one of the biggest positive things that came out of [the name of the product] was, the district health officer who is responsible for monitoring all the health centers when he do health centers, he was able to know sitting in his office the situation on the ground on day to day basis. Which means if he sees someone in yellow, he will directly call the doctor and say, you know what, we found that you are in yellow, and you also know this. So let's go together and do some preventative

measures, or let's take some interventions, and things like that. So which means the system is serving as a relationship which between a doctor on the field and the authority that is the district health officer. So there is a notion of respect, and trust there also. It's a mutually agreed upon sort of expectations that if I am a doctor, and if my health centre is in yellow, I expect that yes, I have to go and do this. And the same thing the health officer who is in charge of all these doctors expect the same from that doctor, and there is very good match of this expectations, and they have good relationship.

R: #00:43:18-7# So how do you find the solution to create trust in your design. Why do you think these solutions can be effective in your system to create trust among different stakeholders of the system?

P: #00:44:27-4# (water break) so, very good question and I have a very logic answer to that. so for every solution, there is a problem. So my job was to find the problem before I find the solution. And the problem was, I don't know if it's true for all of the developing countries, but the behavior of the people, especially in a government setup, which is very bureaucratic. Which means there are levels and class system between people, the health worker is the lowest, and then the doctor, then the district health officer, then the state health officer, and maybe the health minister. So there are this hierarchy of relationship and classes.

P: #00:45:19-0# And one of the biggest problems I would say in any hierarchy is the,ok, let me find the right word, well, it's not relationship. So what I felt in the field was when I was talking with people is there is always it's not suspicion, it's not even mistrust, but I would say there is an absence of domed (assumed) trust, between…because it's a government setup, these guys, so and it goes into like social problems, I don't know if I should bring them out, but the thing is, government employees really badly bit, so they are not the best people you know on the job in certain sense, but common job is say you know they get facilities like house and things like that, you know, many people go for it, but it's not a high paying job, and you wouldn't find like really brilliant people in the government setup, or especially in villages, it's very very hard because imagine if you are like a very doctor from a top medical school, why would you go to a village to you know, practice medicine. You would obviously go to a big hospital to get better returns and things like that. So it's very hard. I am not saying there are none, there are a few doctors like that, but mostly the other doctors were not that motivated and things like that.

P: #00:46:54-5# So there is a lack of trust, not in terms of suspicion that you are doing something wrong, but lack of trust which means are you sure you did your job properly, like that. I found that the health officer was not 100% satisfied with the reporting system that the doctors using. And sometimes what happens is, we found sometimes the disease's number were manipulated so that the doctors under report the cases, nobody wants to be in the red zone, so they would under report the cases. And this is the classic flow of the existing system, which is paper based. Because the doctors have to report at the end of every week for example, so in the week time, they can reverse calculate the average level of Malaria cases to be in a safer zone, because they have time and they can think. But our system did on the other hand is reporting happens everyday, so they never get to see the big picture. And once you reported a data, you cannot change it after a day. So we take information and bits in pieces everyday, and never show the doctor the big picture. If they got the big picture, then they will manipulate the data. But we do not allow that opportunity to manipulate the data at all. So coming back to finding the problem, so the problem was the authorities weren't 100% satisfied by the numbers because India is sort of a free media country, which means the media is very active, and you will find on the newspaper that 50 people are stricken by Malaria, or maybe three people died of Malaria. But if you look at the medical data reported by all these health centers, they have

average numbers, maybe there are only 10 cases of Malaria. So there is a discrepancy between the reality that is reported in the media and then the cases reported by the system. So hence there is some formal flag of trust, and that's what the key point for my design. Ok, there is lack of trust, and right now the lack of trust is in a way motivating people. So trust can motivate people and even lack of trust can motivate people. Which means the expectations are somehow lower from the people you don't trust because you know where they are, you know he is not going to report the right cases. So the expectations are always low in that sense.

P: #00:50:12-9# But automatically, it hurts the system because it makes the system inefficient, so it's not really a technique problem, it's not even like a professional problem of medicine, it's a very human problem and I realized that during you know, interacting with so many people, so the health worker would say, you know, sometimes my authorities or my superiors, they don't think I am doing my job well, but the reality is I doing my job really well. so same thing with the doctors, the doctor might say oh, i am not sure if my health worker goes to all the villages everyday, Maybe he is just sitting somewhere and drinking tea something or something like that. I am not saying all the doctors say like that, but there are some cases which show the lack of trust, which show this satisfaction would be people, not just the system. And then I taught ok if my system has to be accepted then we must solve these issues or other address these issues, minimize these issues, and hence trust became a very important part of my system. In a certain way, I mean I didn't want to design a trust based system that wasn't my goal, but I thought trust would be a fundamental part of my system.

R: #00:51:38-7# Another question is when you interview with the health officer or doctor, maybe they say something like they don't trust , so

P: #00:52:46-9# yes, because you can realize the value of trust by either experiencing trust or experiencing mistrust, so when you experience mistrust, like you trust someone and that person breaks that trust, you realize that the value of trust, on the other hand, if you experience trust like ok you trust someone and he behave in a certain way then you realize the value of trust, in my case, both of these things happen, one was very personal experience in terms of realizing the trust by my childhood experience and on the field, it was not very personal in the sense it was not concerning my life, but then I saw it happening in someone else's life, so I could compare both.