Date 13-11-2020

Interviewer: I will start with some background related questions. At first, I want to know about yourself. Please introduce yourself and your role at your organization.

Interviewee: Let’s start with my role. My role is something called section leader at xxxx hospital and I am section leader for the unit called digtal R&DI. Which means I am responsible of research and innovation project for the digitalization of the health care sector. And I have been here for one hand half years. Before that I have worked at Chalmers for couple of years, before that I have been a consultant and before that I worked at a startup with AI and before that I worked at a company called XXX, pharmaceutical company, doing kind of AI in the pharmaceutical research. Before that I did my PhD in biological medicine. I am not a software engineer, I come from biology side but last 20 years I am working with this. I am still not very technical, but I am pretty technical. I have worked with different domain, in big companies, small companies, academia.

Interviewer: Your total year of experience and how long you are in your current position. I think you have given your answer already.

Interviewee: I have around 20 years of experience and I am in current position around for one and half years.

Interviewer: Please describe your responsibilities in your organization.

Interviewee: I am responsible for research and innovative projects on strategic level at our hospital. We are a big hospital, there are 17000 employees, not everyone is working with digital projects. There are many projects are going on in terms of digitalization and I am having the strategic role, but I am also involved in concreate projects and practically assembled them. Then we are also setting up computer Centre for AI. There are also lot of strategic decisions about how to format, what type of support is needed for the AI projects. What do the researchers need in terms of competence data, access to data, regulations etc. Again, I am also involved in practical work and I have my own kind of research area where I work on hands on AI development as well.

Interviewer: Can you please describe your experience in working with non-functional requirements?

Interviewee: (Interviewee asked about NFRs. What do you mean by NFRs). I think in our sector like in healthcare sector specially when you are working with patient related AI, how to treat the patient or how to diagnosis patient etc. there are some important NFRs. One we are dealing with sensitive data, it’s important that which data can be used by which person with what purpose. When you will build a system, you need to know which data will be handled by that system, how that will be handled and what will be shown to which person, which employees, which physicians etc. Another one is trust, I think. The users for the system need to trust. It’s very important they trust the predictions of the predictive model. You need to have explainability or explainable AI which is something very important specially if you want to go from human base to decision making more into machine automated decision making, but still there’s human somewhere that take a decision and then explain like as transparency. We are also having discussion like bias, which is very important when it comes to gender, race, ethnicity. It’s very easy to focus to group of people and get predictive model and consider how does it perform to generalize and how well does it perform to different patient population basically. So that is also important consideration. Ethics of course, how do we use these tools. I mean perhaps it’s not that important cause ethics is so in the center already. So, people use to think ethically all the time, so it’s not such a big issue comparing to other like when we work with machines where we don’t think about ethics very much. For us, it’s very natural to think about ethics. Usability can be important, but it depends which users are using it. If it is used by all employees at our hospital, then usability might be very important. Integrity is something important when it comes to data access, who will access in which data which is important for AI tool. Usually, efficiency is not such a big deal but when it comes to ICU or close to patient, how the tool needs to respond it can be important. It could be important when we store a large amount of data but currently, we are not generating a large amount of data. Correctness is of course very important because making automated decision somewhat has to do with patient life. Same as reliability, in general I think when you use these types of tools with patient, it’s important to evaluate AI in a good way. Statistically it should have consistency which is giving some benefits. Maintainability is of course something very important. I think we are quite early in our AI phase, so we are not considering that too much because I know things are changing over coming years, so we will switch some tools etc. Testability is not so important. Flexibility right now not so important. If you need to scale up, you can do some changing, so we don’t consider that as much important thing yet. The same with reusability. I think as AI is not so much mature yet, so we are not considering it yet. Same as interoperability.

Interviewer: Do you think these Non-functional requirements can play an important role for the success of the machine learning enabled software?

Interviewee: I think couple of them are more important when it comes to AI. As I mentioned like reliability and correctness are sort of very vital. Usability is not so much right now. Integrity is important. Efficiency is not so much yet at least. Product revision and product transition are not so much important for AI as I think AI and Machine Learning tools are not that much mature as yet. I think these things comes later.

Interviewer: Do you think are some other NFRs that could be included in ML enabled system which can be important for the success of that software?

Interviewee: As Machine learning has to do with data, so data issues could be part of that. I think bias, ethics and fairness can be important. I think correctness like reliability and way of assessing correctness and reliability. You need to be very much data driven evaluating these as well.

Interviewer: Do you think NFRs for whole system or for the model only or for the data or other parts?

Interviewee: I think there are different requirements if it is whole system or if you take the machine learning component. For ML components reliability, transparency, explainability, correctness etc. and for the whole software there are more general requirements like usability.

Interviewer: Do you feel any challenges for NFRs in ML context?

Interviewee: I haven’t thought very much about it. I don’t have anything in my head now.

Interviewer: Do you measure NFRs over ML enabled software?

Interviewee: Yes, evaluating ML models is something we do all the time and I think that is NFRs. We are doing that as part of the ML component also measuring the whole digital system.

Interviewer: How do you measure those NFRs for ML system?

Interviewee: Just evaluating ML models that is usual, like you look at different metrics and cross validation etc. So that is general thing. Then if you want to try this line in prospective study the whole system that has influence on your business or if you want to predict the patient outcome or something. If you set up a clinical trial of something, then you compare with or without machine or with a doctor’s judgement with machine then compare those and, in the end, if you do statistical analysis to see whether it is significant difference.

Interviewer: This measurement is done for whole system or ML model or in data part?

Interviewee: Before you bring the system into production, you need to do it for the whole system. But up to that you can do it component to component.

Interviewer: How do you capture these measurements?

Interviewee: It depends. If it is data in some way, we can use patient journals or something else, some system can collect patient data then we extract that data and compare. If it is just ML component, then we do it on your computer. It’s hard to explain.

Interviewer: Do you face any challenges in measuring these NFRs in ML?

Interviewee: yes. You have some statistical bias that could be quite big in some cases. If you work with historical data and you create machine learning models, then you might be quite bias. So, the challenge is that you need to do some prospective study to actually verify the usar can be benefited by using these ML system.

Interviewer: Do you have anything to add?

Interviewee: This is very interesting because most of these NFRs are sort of in mind and actively working with those. This is very interesting study. I am sure this will be a good thesis at the end. I think there are some generic NFRs for healthcare industry, if you want some generic NFRs, you can also go to other industry like automotive industry etc. where you might get similar ones or might be specific ones in that industry.