

## **Human Computer Interaction (In English)**

**Prof. Rajiv Ratn Shah**

**Department of Computer Science and Engineering  
Institute IIT Madras**

### **Panel Discussion: Ethics, Techniques, and Analysis in Data Gathering**

Hi everyone, I am Ritwik Bamba and I am the teaching assistant for the course on Human Computer Interaction. For today's panel discussion, we have with us Rahul and Harnair. And the topic we have for today is Data Requirement, Gathering and Analysis. The first thing that we need to look at before we start any kind of research is IRB, which is the Institutional Review Board. Well, what is IRB we need to get an IRB approval before we start gathering data on any kind of research and well what is the purpose of IRB it simply ensures that the research meets ethical standards. It means to protect the participants rights and ensures research validity.

It prevents ethical breaches in the data collection and storage and thus increases the credibility as well as the trust in the research outcomes. Then the key considerations that we need to look at for the IRB approval they include Participants are informed about the consent and the data security. There is clear adherence to guidelines regarding the ethical treatment of vulnerable populations. And well, we need to manage participant anonymity in case there is a large scale study.

So let's get into this. Why is IRB approval so critical? The main reason behind getting IRB approval is that the research which involves the human participants, it meets the ethical standards. And why it is critical is because it safeguards the participants' rights and their well-being, which further ensures that the studies are conducted responsibly. And well, without the IRB approval, the research studies may actually lack credibility and may not be publishable in reputed journals. So, can you please explain the process of obtaining the IRB approval? Well, the process is pretty straightforward.

We begin with submitting a detailed research proposal. and which includes the objectives, the methodology, participants recruitment plans and the data handling procedures. This is reviewed by an IRB committee, which evaluates the risks, ethical evaluations, the considerations regarding the compliance with the guidelines. Finally, after addressing their feedback, researchers receive the approval to proceed further. As a researcher, there are some problems which I face while making questionnaires for surveys.

What are some common pitfalls researchers like me face during IRB's approval? Well, small problems may include unclear consent forms, inadequate plans for data security, and bigger problems may actually include insufficient measures to you know protect the vulnerable populations in short safeguarding the participants rights and well sometimes researchers may underestimate the time required for approval and well the delays actually take place if there are certain changes required as recommended by the IRB board. which just delays the project timeline. So how does IRB approval help in dealing with legal or reputational risks? Well, first of all, IRB approval provides a clear documented framework for the ethical considerations and compliances. This simply protects the institutions and researchers from legal issues. Well, The legal issues may actually arise from the participants' complaints or the data's misuse.

IRB approval increases the trust in the studies, increases its credibility, and just ensures overall that the study aligns with the societal values. Well, this was it for IRB. The next topic that we have at hand is discussing various techniques in data gathering. Well, first you need to choose the right technique to collect the data which may include structured interviews, semi-structured interviews and unstructured interviews. Then we have some observations for capturing the context specific details.

This leads us to choosing the kind of interviews that we are going to proceed with. Then we also have questionnaires where we may actually consider what type of questions may actually be required to put in the questionnaire to get as much as much insights possible from the users. We need to look at the question types, the layout of the questionnaire as well. Next, we look at some of the real world challenges, which may include balancing the participants comfort as well as the data quality. And we need to use technology such that we are able to gather as much insights as possible.

Finally, we aim to use lightweight devices which simply help in aiding simple data collection while also ensuring the data quality. How do I decide which data gathering method I should use for a specific type of project? Well, first of all, it depends on the research goals. You need to decide the clear research outcome that you are targeting at. For an in-depth understanding, qualitative methods like interviews or observations are ideal. If numerical trends are required, you need to analyze results statistically.

Questionnaires work best. Various factors like participant demographics and available resources and more importantly, the study's timeline. along with the resources helps us identify which of the techniques for gathering the data are suitable for our research. So what are the ethical considerations while we are collecting or gathering the sensitive data? Well, first and foremost, we need to ensure that the consent is collected from the user before we actually start gathering the data. Informed consent is crucial because it

helps the participant understand that the data is collected and what is it going to be used for.

Further, anonymity must be maintained and data storage needs to comply with the regulations like GDPR. We come back to the IRB approval that Once the study actually gets IRB approval, we may actually go ahead with the topic. For sensitive topics, researchers should try to use non-invasive methods and provide supportive sources to the participants. When I am conducting an interview, I usually face problems like how should I move on to interview? What questions should I ask? So could you throw some light on it? As for the interviews, first thing that we need to ensure is that the participants need to feel comfortable. You need to ensure they are comfortable with talking to you about various sensitive topics that you may actually need to uncover during the interview.

We build rapport with the participants. We may use semi structured interviews. for flexibility and keep a balance between data quality and the comfort of the participants. For observations, we may need to be unobstructed to avoid influencing any of the behaviors. And well, we can always use pilot methods to define them.

So, how according to you can technology assist in data gathering? Well, with the advent of data, and technology being used hand in hand, well, data collection has become much more easier and widespread. And as for the interviews as well, well, digital platforms allows for remote interviews. For questionnaires, online questionnaires may be used like Google Forms. You may just circulate a Google Form across a group of people. who may actually fill it without you actually going to them and asking them to fill each of the questions.

This increases the convenience and accessibility. During the data collection process, the users may encounter various technical challenges which the researchers may actually need to address during the data gathering. This includes ensuring participants privacy and data encryption. The next segment that we move on to is the data analysis and its interpretation. For quantitative analysis, we can have a look at various statistical measures which includes averages, percentages and various graphical representations for a clarity.

And we also need to avoid some of the misleading data interpretations like some measures like mean or median may actually prove to be insignificant in various studies where the frequency of a subject occurring is more important which is the mood. And well while using qualitative analysis We can use various coding frameworks to extract themes and patterns, and we can also leverage various tools like NVPO for efficient qualitative data processing. Furthermore, we can also use a mix of both of the methods,

which is known as mixed method analysis. For doing this, we need to combine the inductive and deductive approaches. We can also use things like triangulation to robust R findings.

What is the difference between qualitative analysis and quantitative analysis when it comes to data gathering? Well, the first difference is the type of data that we are looking at. Qualitative data is very in-depth includes the user experiences. While quantitative data is numbers, you can analyze them numerically, statistically and get findings out of it. So well, quantitative data focuses on numerical data using averages, percentages to identify trends. On the other hand, quantitative techniques may actually require exploring themes and patterns from a textual or visual data.

Both of them require various different tools and techniques and their combination can actually help get even deeper insights which actually happens in the mixed analysis. So, how do you avoid bias during data analysis? Well, the first step that we ensure to avoid any kind of biases is that the selection of participants. if we actually choose participants that are representative of the population, the sample actually is similar to the actual use case of the population. Secondly, we can use standardized coding frameworks and we can conduct the inter-rater reliability checks and also use things like triangulation from multiple sources. Also various automated tools like NVivo also reduce manual errors.

But again, they must be used with knowledge of their limitations. So how does tool like R, SPSS or NVivo help me in data gathering? Well, they don't help you in the data gathering process and such. I mean, R and SPSS, and even Stata for that fact, are tools that actually help in statistical data analysis, which helps researchers manage and visualize large datasets. For qualitative data, we have tools like NVivo. which aid in qualitative analysis in a way that it enables researchers to tag various themes and analyze textual or multimedia content effectively.

The difference is that the quantitative data requires statistical analysis and mathematical tools while qualitative data includes identifying themes from textual or images or other forms of multimedia content. Well, this was it for this panel discussion. Thank you so much.