

Human Computer Interaction (Hindi mein)

Professor Rajiv Ratn Shah

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

Evaluation: Lecture 8

Lec30

[Sangeet] Namaskar. Saptah aath mein aapka swagat hai Human Computer Interaction ke is course mein. Is saptah mein hum mulyankan ke baare mein charcha karenge. Kaise mulyankan kisi bhi maanav kendrit system ka aur Human Computer Interaction base system ka ek abhinn ang hota hai. Kaise hum yeh jaan paate hain ki jo bhi system jo bhi seva hum banana chahte hain woh kitna upyogi hai. Kya woh karya kar pa raha hai jiske liye usko banaya gaya hai. Jaisa ki hum pichle saptah mein yeh bhi padhe ki jab bhi aap ki koi bhi maanav kande system banate hain, Human Computer Interaction base system banate hain, toh alag-alag assumption dhaarnaon ke aadhaar par usko banate hain aur aap uske aadhaar pe jo bhi system aapne banaya hai, aap claim karte hain, daawa karte hain ki woh bada upyogi hoga, bada achhe se kaam karega, jo upyog karta hoga, uska anubhav bada sukhad hoga. Dher saari aap daawon ko pesh karte hain. Par woh daawa kitna sach hai? Kya hum keval jo developer hai ya jo company hai uske daawon ko as it is maan lein? Kya unhone koi mulyankan kiya hai. Mulyankan hi ek tarah tarika hota hai jo humein batata hai. Batata hai ki kaise jo bhi daave kiye ja rahe hain woh sahi hai ya nahi. Mulyankan company bhi karti hai. Mulyankan aap swayam bhi kar sakte hain kisi system ya seva ko use karte samay. Toh chaliye is saptah mein hum mulyankan ke baare mein charcha karenge SCI ke paripeksh. Uske pehle ek quick recap karte hain. Punravritti karte hain ki humne pichle saptah mein kya kiya. Pichle saptah mein humne prototyping ke baare mein baat ki. Prototyping ek tarah se ek namoona hota hai jo humein darshata hai ki jo actual system ya seva hum banana chahte hain woh kaisa hoga woh dikhne mein kaisa hoga. Kis tarah ki functionality hongii iske baare mein humne charcha ki thi. Humne yeh bhi bataya tha ki prototype ek tarah se tarika hota hai jiske madhyam se aap jo aapke idea hai usse converse karne ka usse samvaad karne ka aur usko reality mein laane ke liye ek tarah se uske beech ka madhyam hota hai ki kaise aap jo bhi vichar ko apne mann mein laaye hain, kaise usko conceptualize karke ek concrete model ke through finally hum ek prototype banayein. Jisko hum dekh sakte hain ki hamara jo vichar tha woh kaise dikhne mein hoga. Uski functionalities kaise hongii. Kis tarah woh alag-alag upyogkartaon ki madad karega unke karya ko karne mein. Toh yeh humne prototyping mein seekha tha. Humne prototyping mein seekha tha ki aap alag-alag tarike ke prototype bana sakte hain. Aap nimn star ke prototype bana sakte hain jise hum low fidelity prototype bhi bolte hain. Aap madhya stariya prototype bana sakte hain jise hum mid fidelity prototype bhi kehte hain. Aur aap high fidelity prototype bana sakte hain. Uchh stariya namoona jo ki actual product

vastavik product upkaran ya jo bhi aap seva banana chahte hain usse kaafi had tak milta julta hoga aur humne jaise baat ki thi ki prototyping ek tarah se hai toh namoona hi hai toh ek tarah se pratibimb jaisa ki aapka actual product ya seva dikhne mein jaisa hoga use karne mein jaisa hoga par woh vastavik product toh nahi hai toh usko banane mein humein ek tarah se kuch tarah ke compromises karne padte hain. Toh humne baat ki do tarah ke compromises kiye jaate hain. Pehla compromise vertical prototyping hota hai jismein hum saare functionality ko viksit nahi karte. Hum keval kuch functionalities ko hi viksit karte hain but usko in depth detail mein viksit karte hain. Jaise humne e-commerce ki baat ki thi. Toh e-commerce mein agar aap keval search functionality ko alag-alag tarike ki search functionalities ko poori tarike implement karte hain aur baaki uske aur bhi jo functionalities hain jaise khareedna aur store karna ya recommend karna jo bhi alag-alag functionalities ho sakte hain usko nahi karte hain. Iske vipreet horizontal prototyping mein hum ek tarah se kisi bhi functionality ke detail mein nahi jaate hain. Hum alag-alag functionality jo bhi possible hai uske baare mein kam se kam jaankari dete hue bahut abstract tarike se uske baare mein batate hain ki yeh yeh functionality jaise usmein search bhi hai, add to cart bhi hai, payment bhi hai aur recommend bhi hai alag-alag. But kisi ke hum detail mein nahi jaate hain. Toh dono ke apne alag fayde aur nuksan hai jisko humne detail mein uske upar charcha ki thi pichle saptah mein. Toh aap usko dobara punah dekh sakte hain. Humne baat ki thi smart UI ke baare mein, user interface ke baare mein. Is saptah mein humne ek prototype ke upar tutorial liya tha aur us pe ek panel discussion bhi aayojit kiya tha. Aur weekly assignment ke madhyam se aapne jo kuch bhi seekha uska apne aap ka swayam ka mulyankan kiya tha. Toh isi tarike se humne dekha ki aap ne mulyankan kiya. Apne aap ke apne gyan ko jo aapne arjit kiya tha toh usi tarike se jo bhi prototype jo bhi system hum bana rahe hain woh kitna upyogi hai kitna achha hai kitne achhe se kaam kar raha hai jaise usko kaam karna chahiye kar raha hai ki nahi kar raha hai uske vipreet toh kaam nahi kar raha hai daave kuch bhi ho sakte hain par woh daave vastavikta mein kitne sahi hain woh toh mulyankan ke baad hi pata chalega toh chaliye is saptah mein hum mulyankan ke baare mein charcha karte hain jaante hain unke tarikon ke baare mein, unki mahatta ke baare mein aur kis-kis tarah ka mulyankan ho sakta hai, woh saari cheezon ke baare mein Human Computer Interaction ke drishtikon se hum is saptah mein charcha karenge. Toh, yeh is saptah ki rooprekha hai. Hum baat karenge evaluation mulyankan kya hai? What is the experimental design? Jab bhi hum koi experiment karte hain, parikshan karte hain, toh usko design kaise karna hai? Kis-kis tarike ke mulyankan hote hain? Unka methods kya hai? Alag-alag evaluation methods kya hai? Kaun si evaluation metric humein use karni? Kisse hum maapne maapein? Kaun si maapni humein use karni hai apne mulyankan ke liye? Toh evaluation metric aur again hum phir se apne case study jo ki Braille learning app pe aadharit thi. Uske dwara hum mulyankan ko dekhenge. Ki kis-kis tarike ka mulyankan humne is project mein kiya hai. Is case study aur is project ke madhyam se jaisa ki humne pehle bhi discuss kiya tha. Hum har saptah mein is project ko discuss karte hain ki hum aapke saath-saath chalein aur aap dekhein kaise hum is project ka nirman kar rahe hain step by step. Jismein hum start karte hain ek tarah se ideation phase se. Phir problem ko define karte hain. Phir ek tarah se hum prototype ke baare mein humne charcha ki aur uske baad ek tarah se hum ab dekh rahe hain

ki usmein dheere-dheere aage badhte hue ab uske mulyankan ki taraf ja rahe hain aur aise hum aage badh rahe hain aur ant mein is saptah ke ant mein hum mulyankan ke upar ek tutorial kareng aur Adobe Illustrator se ke saath hum ek hands on experience bhi kareng aur weekly assignment is saptah ke ant mein punah denge jisse aap punah mulyankan kar sakein apne gyan arjan ka jo ki is saptah mein aap kareng. Toh chaliye shuruwat karte hain mulyankan ki paribhasha se. Human Computer Interaction mein mulyankan se hamara matlab hai kaise hum jo bhi system ya utpaad hum bana rahe hain seva bana rahe hain woh kitna upyogi hai kitna prabhavshali hai aur jo user ka anubhav hai us interface aur system ke liye woh kaisa hai toh iska mulyankan karna humein hum is evaluation mein kareng yeh humein mein madad karta hai. Maapne mein kitna achha jo product aapne banaya hai woh jo aapke upyogkarta ki zarooratein hain aur kaise woh unse interact kar raha hai ensuring that jo ki product aapne banaya hai woh sahaj hai, kushal hai aur satisfying hai, santushtidaayi hai. Toh evaluation is not a luxury it's necessary. Bilkul bahut zaroori hai. Tabhi toh hum iska mulyankan kar payenge, maap payenge ki kitna achha system aapne banaya hai. Evaluation ki essence aap is tarike se bhi dekh sakte hain. Agar aap evaluation sahi tarike se nahi kareng toh jitne evaluation aap kyun nahi karna chahenge? Ho sakta hai ki aap sochein ki ismein toh samay lagega. Aap yeh sochenge ismein toh paise lagenge. But agar isko long term mein dekhein toh jitna paisa samay ya apne aapko pareshani dekar evaluation karne ka aapne socha hai iska deerghkaalin jo prabhav hota hai woh bahut mehenga aur bahut zyada hota hai. Iska udaharan yahan pe aap kuch example ke madhyam se dekh sakte hain. Khaastaur pe jab ChatGPT launch hua OpenAI ne kiya toh har koi us daud mein participate karne laga ki kiska jo LLM base chat agent hai kiska achha hai kaun bade achhe se samvaad kar sakta hai kaun bade achhe se uttar de sakta hai usi race mein har company bhaag rahi thi yeh mera LLM hai yeh woh mera LLM hai yeh itna achha kaam kar raha hai woh utna achha kaam kar raha hai toh us samay aapne dekha hoga ki Google bhi us race mein shamil hua aur jaldibaazi mein bina achhe tarike se mulyankan kiye hue usne Bard naam ka ek model release kiya jise hum keh sakte hain ki ChatGPT ke pratidwandi ke taur par usko pesh kiya gaya. Jab Chat Bard ko launch kiya gaya us din uske ek tarah se jo launch tha demo tha usmein Bard ne ek prashn ke uttar mein galat jawaab de diya toh us galat jawaab ke chakkar mein jo share market tha woh Google ko itna bada jhatka diya ki aap dekh sakte hain ki kuch samay mein bade kam samay ke antral mein Google ki company company ka jo market valuation tha woh \$100 billion gir gaya. Toh aap yeh soch sakte hain ki \$100 billion kitni badi rakam hoti hai. Toh how Google new launch Bard company lose \$100 billion toh agar unhone mulyankan achhe se kiya hota saari paristhitiyon ka achhe se maapni dwara jo uske suitable maapni hai jo evaluation metric hai uske madhyam se kiya hota toh shayad yeh galti nahi hoti. Par wahan par toh race lagi hui thi. Har kisi ko jaldi se jaldi apna LLM dikhana tha. Aur usi chakkar mein Google ka jo Bard tha woh fail hua. Us samay woh bhale hi alag baat hai ki uske baad Google ne aur bhi achhe se uska mulyankan kiya. Uska rigorous testing kiya, evaluation kiya aur uske baad punah Bard aaya aur abhi bhi hai aur bade achhe se kaam kar raha hai. Lekin agar woh cheez unke launch ke pehle ho gayi hoti toh aap soch sakte hain jo \$100 billion ka unko nuksaan hua tha woh usi chand samay mein unko \$100 billion ya usse zyada ka fayda bhi ho gaya hota. Is tarah ke aneko

example hain. Aap Meta ke baare mein bhi dekh sakte hain. Meta ke ya Facebook ke Cambridge Analytica ka jo scandal hua tha uske baare mein aap mein se kaafi log ko pata hoga. Toh usmein ek tarah se dekhte hain 725 million ka ek tarah se Meta ko fine dena pada tha. Cyber Cab flop cost Elon Musk \$12 billion as Tesla share take a dive. Yeh bhi ek tarah se mulyankan ka hi ek kshetra hai. Jaise us samay unhone jo cyber cab launch kiya unhone bola ki ab aap is par hathaude se maareng tab bhi sheesha nahi tootega. Aur yeh bade unko sharmasaar karne waali ghatna hui jab demo aur launch ke dauran unhone hathaude se maara aur sheesha toot gaya. Toh ek tarah se aap dekh sakte hain kaise ek galti se ek jo mulyankan unka tha achhe se nahi hone ke kaaran unko kitna bada loss hua. Usi tarike se ek aur example hai Snapchat ne. Snapchat ne 40 million ka loss kiya jab unka spectacles flop hua. Microsoft wrote down \$900 million worth Surface RT inventory. Toh again aise aneko example hain. Agar evaluation ya mulyankan achhe se hua hota. Shayad itna bada nuksaan in companiyon ko nahi jhelna padta aur toh isko evaluation ke liye alag-alag jo tarike hain unko dhyan mein rakhte hue aur sabse badi baat hai yeh jitne bhi mulyankan kiye ja rahe hain ya hone chahiye aapke upyogkartaon ke zaroorat ko dhyan mein rakhte hue kiye jaane chahiye. Agar aap unki zaroorat ko dhyan mein nahi rakhenge toh mulyankan safal nahi hoga. Toh in sab cheezon ka dhyan dete hue humein aage karna chahiye. Toh chaliye aage badhte hain. Toh agar hum upyogita ko punah yaad karein usability ko toh SCI ke andar upyogita hoti hai jo ki dikhata hai ki kitna saral tarike se kushalta purvak aur ek tarah se santushtidaayak jiske madhyam se jo aapka upyog karta hai apne saare lakshya ko uddeshya ko bade achhe se poora kar sakta hai. Apne samvaad ke dauran jo bhi aapne system banaya hai aur ek tarah se usability jo upyogita hoti hai ki aspect hota hai yeh user centered design ka jo ki focus karta hai jo bhi system aap bana rahe hain usko intuitive banane ke liye sugam banane ke liye aur prabhavshali banane ke liye jo bhi aapke stakeholder hai jo bhi woh aapke upyog karta hai toh usability is a critical for ensuring system meet user needs effectively enhancing adoption retention and overall user satisfaction toh upyogita ke kai key dimensions hain. Effectiveness kitna woh prabhavshali hai. The accuracy and the completeness with which users can achieve their goals. Toh yeh hum uske prabhavshali tarikon ko na maapne mein use karte hain. Kitna efficient hai, kitna kushal hai. Kitna tezi se woh apne karya ko kar pa raha hai. With minimal effort. Kam se kam effort lagake kaise woh kar pa raha hai. Learnability kitna aasani se usko kitna aasani se woh jab uske saamne system ko pehli baar rakha ja raha hai toh bade aasani se kaise woh kar pa raha hai first attempt mein memorability agar woh us karya ko pehle kar rakha hai. Agar usko dobara woh system diya jaaye toh kitna aasani se jo returning user hoga apne proficiency se apna karya kar pa raha hai. Error tolerance how well the system prevent errors or help user recover from there? Toh sabse pehle toh humein ensure karna chahiye ki galti hi na ho. Agar thode bahut galti ke chances ho turant woh usko sahi karne ki koshish karein ya inform kar de aur agar galti ho bhi jaaye toh kisi bhi tarike se usko usko recover karne mein madad karni chahiye. Satisfaction jo ki ek tarah se user ke comfort ko batata hai. Kitna santusht aur aananddaayi tarike se positive experience ke saath woh system ke saath samvaad karta hai aur apne karya ko complete karta hai. Toh agar hum kisi real world example ki baat karein jaise ki alag-alag taxi app aap use karte hain. Uber, Ola jo bhi use karte hain. Agar hum

unki upyogita ke baare mein baat karein toh jaise sabse pehle kushalta ke baare mein baat karein toh allows users to book a ride quickly. Kitna tezi se aap apne upyogkarta ko jo taxi hai, cab hai ya bike hai kitna jaldi se jaldi usko book karne mein madad karte hain. Error tolerance minimization error such incorrect. Galti se ho sakta hai ki aap jo pickup hai woh galat aapne kar liya hai. Select kar liya ya drop ko galat toh aapko kya system support kar raha hai help kar raha hai usko sahi karne mein kitna achhe se kar pa raha hai that is error tolerance by intuitive enough for the first user to navigate easily learnability toh kaise agar koi upyogkarta hai pehli baar aapke app ko use kar raha hai kitna aasani se aap usko uske karya ko karne de rahe hain chahe woh jo bhi cab booking ho chahe rescheduling ho chahe cancelling ho jo alag-alag task kitne aasani se pehli baar mein first attempt mein woh kar pa raha hai. Effectiveness kitna prabhavshali hai. So ensure the ride is successfully booked and the driver reaches the correct location. Toh yeh ek tarah se kitna prabhavshali kitna accurate hai woh prabhavshali evaluation mein naapa jaata hai. Memorability by easy of by easy to use again even after a long. For example aap particular car booking app ko kaafi samay pehle use kiya tha. Ab dobara usko aapne start kiya. Toh kaise aap kitna sugam tarike se bade achhe se aap aapko interface pata hai yaad hai ya aap turant bina kisi deri ke bade jaldi se aap usko book kar pa rahe hain. Last mein satisfaction. So ensuring feel satisfied with the overall experience. Jo bhi aap usmein karya karna chahte hain, booking karna chahte hain, cancel karna chahte hain, kisi aur ke liye book karna chahte hain, pickup drop ko change karna chahte hain, beech mein stop add karna chahte hain, kisi ke saath ride share karna chahte hain. Toh yeh saari cheezein kitne achhe se aap kar pa rahe hain. Ride quality kitni achhi hai. Payment aap bade aasani se kar pa rahe hain. Feedback process kitna achha hai. Toh ek tarah se yeh satisfaction mein aata hai. Toh agar humein usability ko maapna hai toh humein in paimane ke ko dekhna padega. Kitna achhe se kitna efficient hai woh kitna effective hai kitna achhi learnability ya memorability hai error tolerance kitna achha hai satisfaction kitna achha hai toh yeh saari cheezein humein maapne ki zaroorat hai agar yeh saari achhi cheezein achhi hongi toh bahut hi upyogi system hoga aur log usko khule haathon se use karenge toh chaliye yeh hum task aapko dete hain toh jis tarah se humne cab booking app ke liye usability ke alag-alag aspect ko discuss discuss kiya. Chaliye agar main aapko ek task deta hoon live streaming app like Jio aur Hotstar aap logon ne kaafi use kiya hoga abhi IPL ke dauran toh kya aap unki efficiency, effectiveness, learnability, memorability, at and satisfaction ke baare mein bata sakte hain? Chaliye, yeh main aap pe chhodta hoon aur aasha karta hoon aap karenge. Aur activity agar main aapko doon usi se related find the list of product which are failed due to the lack of evaluation and user study. Toh aapki nazar mein koi aisa product hai jo ki lack of evaluation ki wajah se, mulyankan achhe se nahi hone ki wajah se, user study achhe se nahi hone ki wajah se, user ke feedback ko achhe se nahi lene ki wajah se fail hua hai. What do you think? I am sure ki aapko kuch na kuch toh aisa milega. Agar aisa milta hai. What do you think? Aapne aap kya kar sakte the usko bachane ke liye ki woh fail na hota ya usmein kya changes aur kar sakte the. Toh yeh main aapke upar chhod raha hoon. Aapne abhi tak jitne bhi concept seekhe hain is course ke dauran abhi tak aap un saari cheezon ko apply kar sakte hain aur bata sakte hain. Kya aapko karna chahiye tha to avoid the same. Ek aur task dete hain. Find the list of product around you in

real life and tell me what motivates you to use it further or leave. Aap apne jeevan mein abhi tak dheron aise app use kiye honge. Dheron aise website dekhe honge. Dheron aise product use kiye honge. Unmein se kaafi aap continue karte rehte hain use karna. Aur unmein se dheron aise honge jinko aapne pehle ya doosre use ke baad chhod bhi diya hoga. Toh aapki aapko kya lagta hai? Aapne aisa kyun kiya hoga? What motivates you to use it further or leave? Toh again apne real life mein aaspaas ke aise jo cheezein hain jo aapne pehle bhi use kar rakhi hain. Dekhiye, bataiye aur sochiye. Mulyankan mulyankan ka usmein kya role raha hoga yeh bhi sochiye. Toh chaliye evaluation in Human Computer Interaction toh ek tarah se iterative design and evaluation jaisa ki main baar-baar bolta hoon jo ki hum maanav kendrit system bana rahe hain. Human centered system bana rahe hain. Human Computer Interaction base system bana rahe hain. Jahan par hum manushya aur jo bhi computer ya mobile ya anya upkaran unke beech mein samvaad sthapit karna chahte hain interface ke madhyam se. Toh yeh saari cheezein manushya koendra mein rakhti hain aur aapko alag-alag stages mein alag-alag stages mein alag-alag feedback alag-alag jo aapke upyogkarta hai unse lene ki zaroorat hai. Alag-alag stakeholder se lene ki zaroorat hai aur usko iteratively continuously apne design mein apne development mein usko incorporate karne ki zaroorat hai. Toh ek tarah se iterative design and evaluation is a continuous process that examines kyun? To check users requirement and confirm that user can utilize the product and they like it. Kyunki evaluation karne ki zaroorat kyun hai? Isse humein pata chalta hai ki jo aapke upyog karta hai, product ko achhe se use kar pa rahe hain, utilize kar pa rahe hain aur usko pasand kar rahe hain. Kyunki ultimate aim toh aapka yahi hai na ki usko use karein, prayog milayein aur usse khush ho. Aur jo upyogkarta ki zarooratein hain woh poori tarah poori ho rahi ho. What? Toh ek tarah se yeh conceptual model hai early and subsequent prototypes of new system more complete prototypes and prototype to compare with other competitors product. Toh ek tarah se yeh jo shuruwat ke system hai even baad ke bhi system mein hum usko aur achha banane ke liye jo aur bhi competitor aapke market mein hai unse compare karne ke liye unko unse dekhne ke liye hum ek tarah se mulyankan karte hain. Kahan karne ki zaroorat hai? Best toh yeh rahega ki jo aapka natural setting hai rather than jo laboratory setting hai wahan pe karein. But kabhi-kabhi yeh possible nahi hai ki aap turant in the wild aur natural setting mein ja sakein. Toh us case mein laboratory setting mein bhi simulated setting mein bhi aap evaluation kar sakte hain. Kab karein? Toh actually isko har samay karne ki zaroorat hai. Har phase mein har stage mein karne ki zaroorat hai. So throughout the design finished product can be evaluated to collect information to inform new products. Toh evaluation ka fayda kya hai? Iske kai fayde hain. Jaisa ki humne briefly pehle bhi discuss kiya tha. Woh upyogita ko badhane mein madad karta hai. Toh regular evaluation helps identify usability issue jo bhi upyogita mein dikkatein ho rahi hai mulyankan ke dauran woh aapke saamne aati hain aur jab aapke saamne aayenge toh aap unko fix karenge unko sahi karenge aur agle iteration continuous iteration ke madhyam se agle iteration mein us jo dikkatein aapne abhi face ki thi usko sahi karenge. It enhances user experience jo upyogkarta kiya ka anubhav hai usko aur achha banata hai. Kyunki jab aap mulyankan karte hain toh aapko yeh pata chalta hai ki aapke utpaad ya aapke jo services aapne banayi usko upyog ke dauran mulyankan ke dauran aapke upyogkarta ko kya-kya dikkatein aa

rahi hain? Unki aashayein kya thi aur kya un aashaon ke anuroop aapka system kaam kar raha hai? Agar karega toh positive experience nahi hoga. Agar nahi karega toh aapko usko sahi karne ki zaroorat hai. Toh deliver positive experience aapko ek tarah se mulyankan ke madhyam se aap pata karte hain aur jo bhi trutiyan hoti hain, jo bhi cheezein sahi karni hoti hain, aap usko karte hain. Confirm design decision jo bhi design ke samay aapne decision liye the, toh kya woh design jo tha, woh finally concrete level par develop hua? It helps validate whether design choices align with the user needs and the context. Toh yeh aap ek tarah se mulyankan ke dauran check kar sakte hain. It minimizes the risk by testing with the real user you can minimize the risk of building a product that doesn't work in real life scenario. Toh at least agar aap real user ke saath mulyankan karte hain unko jo bhi product samvaad bana rahe hain samvaad ke dauran dekh sakte hain ki woh karya kar raha hai nahi kar raha hai aur agar simulated aur laboratory setting mein kaam kar raha hai toh at least aap usko baad mein in the wild test kar sakte hain evaluate kar agar simulated ya laboratory setting mein hi kaam nahi kar raha hai toh aap usko toh expect kar hi nahi sakte ki real setting mein bhi kaam karega natural setting mein kaam karega toh ek tarah se yeh saare evaluation mulyankan ke dauran aap jo galti hone ke chances hain woh aur kam kar sakte hain. Yeh jo user ka engagement hai, sahyog hai, paraspar sahyog hai, usko aur achha karta hai. So regular evaluation help user ensure that the system align with the user goal and the preferences resulting in better engagement. Yeh ek tarah se jo overall cost hoti hai, deerghkaalin cost jisko main bolunga, usko bhi kam karta hai. Jisko abhi humne Google ke Bard ke example ke dauran bhi dekha. So by identifying and fixing usability problems early evaluation reduces the risk of costly redesign after launch. Positive insights for continuous improvement. Toh ek tarah se jab yeh jo lagatar mulyankan aap kar rahe hain alag-alag stages mein alag-alag upyogkartaon ke saath woh aapko madad karta hai refine and improve the user experience jo upyogkarta ka anubhav hai samay ke saath aage jaise-jaise aap development aur design karte jaate hain. Example ke taur pe aap dekh sakte hain smartphone app evaluation. Toh testing a new social media app with user to ensure that features are easy to use and the interface are intuitive. Toh smartphone ke is evaluation se aap dekh sakte hain. Aap check kar sakte hain ki jo sach mein aapne feature banaya hai, kitna upyogi hai, kitna saral hai. Kitne achhe se jo uska interface hai, woh kitna sahay hai, kitne achhe se aasani se woh usko use kar pa raha hai. Toh, is wajah se agar aap dekhein, toh evaluation is not one time. Jaisa ki maine bola yeh satat prakriya hai. Lagatar aapko evaluation karne ki zaroorat hai. And it is an ongoing process that ensures that design remains relevant and the useful. It is being said by none other than Don Norman. Toh ek tarah se humne jaana evaluation kya hai? Aur chaliye ab jaante hain ki in mulyankan karne ke liye humein ek tarah se kuch experimental setup chahiye hoga. Kuch experimental design chahiye hoga toh woh kya hota hai? Woh kya hoga? Toh experimental design jo hoga woh control setting mein ho sakta hai. That directly involves user for example usability and research labs. Natural setting involving user. Natural setting mein ho sakta hai. Jaise ki online communities ho and the product ho jo ki public places mein use kiye ja rahe hain. So agar hum natural setting mein karenge toh humein hamara jo control hota hai evaluation design pe bada kam hota hai. Toh that is why there is little or no controller what user do especially in the wild

setting. But achhi baat hai. Yeh toh kyunki end of the day jo bhi product aap bana rahe hain woh toh in the wild hi mein hi use honge. Natural setting mein real life setting mein use honge. Toh is wajah se toh but control setting ka khud ka ek alag mulyankan hai. Kyunki zyada tar jo initial bugs hote hain ya initial issues hote hain, woh control setting mein mulyankan ke dauran hi paaye jaate hain aur aap usko phir aage sahi kar sakte. Toh ek tarah se control setting mein jo bhi aap issues ko find kar rahe hain, jo bhi mulyankan karna chahte hain, experimental design mein jo bhi aap test karna chahte hain, chahe visibility ho ya jo bhi ho, woh aap control tarike se apne hisaab se jo bhi aapne experimental design kiya hai, uske madhyam se kar sakte hain. Aur ek baar woh saari cheezein fix karne ke baad aap in the wild setting mein bhi natural setting mein bhi uska mulyankan kar sakte hain. Toh dono ka apni alag mahatta hai aur hum directly in the wild setting mein nahi jaana chahiye kyunki humein pata hai ki jo bhi system humne pehle banaya usmein dher saari dikkatein hongii. Agar hum seedhe in the wild setting mein jaayenge toh woh samasya itni dher saari hongii jo ki kyunki in the wild setting ka jo setup hota hai woh kaafi costly hota hai. Mehenga hota hai, samay leta hai. Toh jitni zyada se zyada cheezein hum pehle control setting mein, laboratory setting mein mulyankan ke dauran pa sakte hain aur unko fix kar sakte hain. Uske baad hi humein natural aur in the wild setting mein jaana chahiye. So any setting that does not directly involve user for example consultant the research critique for prototype may predict the model how successfully will they will be when used by the user toh agar aap apne user ko involve nahi karna chahte seedhe expert ki rai mein lena chahte hain toh woh bhi aap kar sakte hain but uske alag apne fayde aur nuksaan hai kyunki aap ek tarah se keval apne expert ki rai pe jaate hain karte hain but jo real user hota hai woh kaun-kaun si galti karta hai, kaise karta hai? Woh har tarah ka user hota hai. Jaise humne baat ki woh novice bhi ho sakta hai, expert bhi ho sakta hai, har tarah ka user hota hai. Alag-alag tarah ki galtiyan kar sakta hai. Alag-alag tarike ke environment mein use karega. Woh cheezein expert har har kuch nahi pata hai aur woh thoda sa negative points hota hai. But jab hamare paas direct user ka access nahi hota hai toh hum is madhyam se bhi aage badhte hain aur best tarika toh hybrid tarika hi hota hai. Sabse pehle aap expert ke through aur control setting mein ek achha mulyankan kar lein. Jab aap satisfied ho ek stable system lag raha hai tab aap uske baad natural setting mein jaiye aur uska punah mulyankan kariye. Jisse ki jo cheezein positive situation mein sahi tarike se chal rahi hain. But jab usko ek robust ab usko ek natural setting mein jahan pe cheezein ast-vyast hain. Jahan pe kuch bhi ho sakta hai random ho sakta hai. Wahan pe aap mulyankan karenge. Toh jo aur bhi adhik dikkatein hongii jo ki initial phases mein find out nahi hui aap wahan par unka unka pata laga sakte hain aur unko fix kar sakte hain. Toh field studies jahan pe field studies are done in the natural setting. Toh in the wild is a term for prototyping being used freely in the natural setting. Jaisa ki humne baat ki toh it seeks to understand what user do normally and how technology impact them. Toh ek tarah se humein jo real setting hoti hai jo real environment hota hai kaise jo aapke alag-alag user hain usko use karne ja rahe hain aur technology kaise us pe apna prabhav daal rahi hai woh hum dekhte hain. So field studies are used in product design to identify opportunities for the new technology. Ek tarah se humein jo nayi technology ka prayog karna hai usmein madadgaar saabit hoti hai. Determine design requirement jo bhi design requirement

humein lag rahe hain unka pata lagata hai. Decide how the how best to introduce new technology kyunki har koi tech savvy nahi hota hai. Har user tech savvy nahi hota hai. Toh unko hum kis aur best tarike se tech ko introduce kar sakte hain. Woh bhi ek tarah se mulyankan ke madhyam se hum pata kar sakte hain. So evaluate technology in use jo bhi technology hum use kar rahe hain, takneeki use kar rahe hain, uska mulyankan bhi zaroori hai. Woh kitna sahi kaam kar rahe hain, kitna galat kaam kar rahe hain. Toh experimental design mein humein yeh bhi dekhne ki zaroorat hai ki hum evaluation kin ke beech mein kar rahe hain. Jaise alag-alag between subjects jo alag-alag jo participant hai unke beech mein kar sakte hain. Jaise single group of participant is allocated randomly to the experimental condition. Toh iske fayde apne fayde aur nuksaan hai. Jaise ismein koi order effect nahi hai kyunki aap random select kar rahe hain aur kaun sa kyunki individual differences hain logon ke. Same logon ke beech mein kar sakte hain. Yahan pe all participant appear in both condition natural setting aur ek tarah se control setting mein. Toh pros and cons of few no individual differences. Kyunki same user hai woh usse familiar bhi ho jaata hai aur uske alag woh fayde hain ki woh aasani se kar paata hai. But nuksaan yeh hai ki counter balancing need due to ordering effect. Ki hum yahan pe same participant ke beech mein kar rahe hain toh unka order bhi farak padta hai. Matched participant pair wise participants are matched in pairs for example based on the expertise gender and so on. Toh benefit iske yeh hai individual differences reduce ho gaye kyunki aapne unke group ke hisaab se pair kiya hai aur iske negative point yeh hai ki cannot be sure of perfect matching on all the differences. Ek aur bhi aham bindu hai jo ki experimental design mein humein dhyan dene ki zaroorat hai. Kitne evaluator ko humein involve karna chahiye. Kitne logon ko humein involve karna chahiye ek achhe evaluation ke liye. Toh alag-alag study research hue hain is direction mein. Toh jaise Nelson ka ek study suggest karta hai ki on average jo five evaluator hote hain woh 75 se 80% jo upyogita se related problems hote hain unka pata laga lete hain toh achhi baat hai paanch se saat but un baaton ka aapko dhyan dena padega ki jo paanch se saat evaluator hain mulyankankarta hain woh diverse hone chahiye alag-alag group ke hone chahiye alag-alag tarike ke upyog kar upyogkarta hone chahiye aisa nahi hona chahiye keval ek hi tarike aapke aapne upyogkarta ko le liya aur unse aap mulyankan karana chahte hain. Cockton aur Waller's ka bhi similar observation tha. Unhone bola ki 75 se 80% usability problem depends on the context and nature of the task problems. Toh similar observation aap yahan par bhi dekh sakte hain. Toh chaliye dekhte hain alag-alag mulyankan ke prakaar kya hain. Toh sabse pehla prakaar ek tarah se aap keh sakte hain formative evaluation. Toh chaliye jaante hain kaun-kaun se alag-alag prakaar hote hain evaluation ke liye. Toh sabse pehla prakaar ek tarah se hota hai formative evaluation jise hum vikasantmak evaluation bhi kehte hain jo ki development ke dauran vikas ke dauran use kiya jaata hai. Toh jaisa ki yahan pe likha hua hai conducted during the design process to gather feedback and guide the development of the interface. Jo bhi interface aap bana rahe hain, jo bhi design kar rahe hain, toh yeh poore vikas ke dauran apne upyogkartaon se aap unke feedback lete hain aur usko incorporate karte rehte hain continuously usko improve karne ke liye. Toh, yeh humein madadgaar saabit hota saabit hota hai jo alag-alag prototypes aur design ideas hain, unko refine karne mein, unko aur achha banane mein. Example ke taur pe aap dekh sakte hain user feedback

from a prototype of navigation app is gathered before the final version is developed. Toh jo bhi prototype ke upar user ke feedback hain chahe woh navigation ke liye ho woh final version ke develop hone ke pehle hi mil jaate hain. Vikas ke dauran mil jaate hain. Toh iska fayda yeh hota hai it helps inform design decisions and provide early stage feedback before the launch. Kyunki hum final launch ke baad galtı bardasht nahi kar sakte. Jaisa ki humne Bard ke example mein dekha. Toh iske liye alag-alag method use kiye jaate hain. Usability testing use ki jaati hai early prototyping ke liye. Expert reviews diye jaate hain heuristic evaluation ke liye. Jahan par aap jo alag-alag expert hain unke anubhav ke aadhaar pe aap evaluation karte hain. Survey and questionnaire karte hain. Pre release feedback release karne ke pehle ek tarah se aap questionnaire survey dete hain aur dekhte hain kitna achhe se yeh kaam kar raha hai. Doosra hai summative feedback jo ki ek tarah se jab product ban jaata hai developed ho jaata hai uske baad iske mulyankan ke liye hota hai ya ek tarah se dekh sakte hain to assess its overall effectiveness jo uski upyogita hai overall woh kaisi hai kitni achhi hai aur yeh hum dekhte hain typically involves usability testing with a larger group of users. So ek tarah se jo dher saare logon upyogkartaon tak pahunchte hain aur janne ki koshish karte hain. Yeh kitna upyogi hai, kitna aananddaayi hai. Kitne achhe se apne karya ko kar raha hai. Example ke taur pe dekh sakte hain. Post launch survey for a website measures user satisfaction kitna anubhav aananddaayak hai. Aur gather feedback on the final product jisse ki final product launch karne ke pehle aap ek tarah se aap unse feedback leke kar sakte hain. Toh iska fayda yeh hota hai provides final confirmation of the product's usability overall sab kitna achha yeh kaam kar raha hai. Helps assess user satisfaction after use after using the full product. Toh ek tarah se ek poore product ke liye overall holistic evaluation ho paata hai. Toh iske liye jo method use kiye jaate hain post long survey kiye jaate hain. Yeh bhi testing ki jaati hai aur final usability testing ki jaati hai. Teesra hai diagnostic evaluation jise hum nidanatmak mulyankan bhi bol sakte hain. Yeh ek tarah se development ke pehle kiya jaata hai. Toh it focuses on identifying specific problem or issues with in the system. It helps to understand where usability issues are occurring in the design. Aur example ke taur pe agar hum dekhein toh yeh ek tarah se cognitive using cognitive walk through on the online booking system to identify users in a navigational and the task completion. Kitni aasani se step by step tarike se woh apne karya ko kar pa raha hai. Toh yeh cheezein hum ek tarah se diagnostic evaluation mein karte hain. Toh benefit iska yeh hai helps in specific jo mainly ek tarah se keh sakte hain ki unko main dikkato ka saamna karna pad raha hai. Kis point pe karna pad raha hai. Kis part mein karna padta hai. Yeh ek tarah se iska pata lagata hai aur designers ko ek tarah se usko improve karne ke liye madadgaar saabit hota hai. Toh, uske liye task analysis, cognitive walk through aur heuristic evaluation in methods ka istemal kiya jaata hai. Iske nidan ke liye. Chautha jo ki bahut hi zaroori mulyankan hai. Longitudinal evaluation, deerghkaalin mulyankan. Ismein hum basically kya karte hain ki longitudinal evaluation involves studying user interaction over a long period of time. Ek tarah se lambe samay ke dauran overall aap unke feedback unke user experience in sab ke baare mein dekhte hain. Understand how the product performs and how user adapt to it over the time. Toh example ke taur pe dekh sakte hain. Jaise maine bola ki deerghkaalin hota hai woh ek saal aur usse bada bhi ho sakta hai, chhota bhi ho sakta hai. Toh

conducting a year long study on the use of fitness app observing how users engagement and the goals changes over the time. Toh iske jo fayde hote hain tracks long term user behavior and satisfaction and identify evolving needs and potential issues. Toh yeh jo deerghkaalin evaluation hote hain, woh humein kaafi important aur zaroori jaankari dete hain aapke jo bhi users hain, unke liye personalize system banane mein. Yeh bhi dekhne mein ki jo deerghkaalin hamara user hai, woh kis cheezon ko achhe se pasand karta hai, kisko nahi pasand karta? Is baat ki bhi insight humein milti hai aur over the time kya usko koi cheezein dikkat kar rahi hain kya woh un dikkato ko adopt kar le raha hai kya tarika hai jisse ki hum usko personalize solution de paaye yeh saari cheezein bhi hum dekhte hain toh iske liye user diaries long term usability testing survey over the time yeh saare methods use kiye jaate hain. Toh chaliye jaante hain what are the evaluation methods. Kin-kin methods ke madhyam se yeh kiya jaata hai. Toh pehla humne kai evaluation type mein baat ki usability testing ki. Kaise hum upyogita ka mulyankan kar sakte hain. Toh it involves observing real user as the interact with the product to identify usability problems. Jo bhi upyogita se related samasyayein hain, task completion difficulty unko apne lakshya ko complete karne mein jo dikkato ka saamna karna pad raha hai, and the areas improvement kaise hum kahan pe aur improve kar sakte hain overall user experience ko badhane mein, usability ko badhane mein. Example ke taur pe dekh sakte hain. Testing a website redesign with users to see if they can easily navigate to the key section jo aapka mukhya section hai kahan kahin woh aasani se wahan pe jaa pa raha hai apne karya ko kar pa raha hai and complete a task making like making a purchase jaise koi bhi e-commerce website hai kya woh saare karya kar pa raha hai search kar pa raha hai dhoondh pa raha hai compare kar pa raha hai aur finally usko khareed pa raha hai toh benefits iske yahi hai provides real user feedback and helps identifying design flaws. Toh iske jo steps hain define task for user jo unko karna hai. Observe how they interact. Kaise woh interact kar rahe hain, kaise apne karya ko kar rahe hain aur finally kaise hum quantitative and qualitative data ko ikattha kar rahe hain jisse ki hum alag-alag insight nikal sakein. Alag-alag cheezon ka mulyankan kar sakein. Doosra hai heuristic evaluation jo ki anubhav ke aadhaar par expert karte hain. Toh a usability inspection method where a small group of evaluator assess the interface based on their established usability principle jo bhi established upyogita ke principles hain heuristics hain unke aadhaar pe anubhav ke aadhaar pe unka mulyankan karte hain. Jaise example ke taur pe dekh sakte hain. An expert reviewer use Nelson's heuristics jo ki bade aise ek tarah se jo anubhav ke aadhaar par aise principles banaye gaye hain usability ki yeh cheezein honi chahiye kya woh hai ki nahi hai jaise humne shuruwat mein is saptah is lecture ke shuruwat mein humne usability ki kai cheezein batayi thi jaise woh kitna effective hai kitna efficient hai kitna error tolerant hai kitna learnable memorable aur satisfaction hai to evaluate the usability of a shopping cart interface on an e-commerce website. Toh, kaise hum kar sakte hain? Toh, iske fayde yeh hain. Yeh bade jaldi se aur quick cost effective tarike se identify many usability issues early. Toh shuruwat mein hi jo aap even jo aapke mukhya upyogkarta hain unke paas jaane ke pehle hi yeh saari cheezon ka aap dhyan mein rakhte hue agar evaluation karte hain heuristic ke madhyam se toh zyada tar galtiyon ko aap wahin pe early stage mein hi fix kar sakte hain. So yeh Jakob Nielsen ke dwara 1990 mein banaya gaya tha aur bahut hi zyada chalan mein hai. Toh iska

jo mukhya steps hai expert review the interface jo aapne sampark bindu antar falak banaya hai usko expert review karta hai aur identify karta hai jo bhi jo possible usability ke concern hote hain jo apne anubhav aur usability principle ke aadhaar pe woh dekhta hai and the results are compiled and prioritized and finally woh jo bhi uska uttar hai usko combine karta hai compile karta hai aur priority order mein aapko deta hai jisse ki aap us work kar sakein aur fix kar sakein. Toh uske baad jaise ki humne yeh dekha ki 1990 mein heuristic aaya tha. Uske baad 2014 mein isko phir se revise kiya aur is pe focus kiya recognition rather than recall. Flexibility and efficiency of use aesthetics and minimalist design help user to recognize diagnose and recover from error help and documentation visibility of the system status jaise aap dikhte hain ki aapne koi button dabaya upload toh file upload ho rahi hai. Itna percent upload ho gaya hai. Match between system and the real user user control and the freedom. Kitna user ke paas control hai apne karya ko karne ke liye aur consistency and standard kitna consistent hai. Kahin aisa toh nahi har page pe har interface pe usko change karte jaa rahe hain. Notion change karte jaa rahe hain. Error prevention galti na hone dein. Agar ho bhi jaate hain toh kitna jaldi se aap recover kar rahe hain. Toh doing heuristic evaluation toh ek tarah se briefing session to tell expert what to do aur evaluation normally yeh kaafi short time mein hota hai. Evaluation period of one to two hours in which each expert work separately. Take one pass to get a feel of the product and take a second pass to focus on specific features aur uska mulyankan karta hai aur apne jo bhi feedback aur comments hain unko compile karke aapke saath share karta hai. Finally de-briefing session mein expert work together to prioritize the problem ki jitna bhi aapne alag-alag problems nikaale the. Chaliye unko hum rank order mein batate hain. Sabse pehle kis problem ko solve karna chahiye. Us hisaab se un prioritize mulyankan ke hisaab se aap unko fix karte hain aur punah ek naya revised version of prototype ya jo bhi design aap bana rahe usko bana ke apne upyogkarta ko dete hain evaluation ke liye. Toh iske fayde nuksaan kuch is tarike se hain. Few ethical and practical issues to consider because users are not involved. Can be difficult and expensive to find the expert. Har area ke aapke paas expert nahi hai. Kaafi mehenge bhi ho sakte hain. Best expert have knowledge of application domain and users. Sabse badi problem yeh hai. Important problems may get missed. Many TV problems are often identified such as false alarm and experts may have some of their bias. Agla jo method hai mulyankan ka cognitive walk through jahan par aap step by step apne upyogkarta ko batate hain ki is system ko kaise use kiya jaaye aur aap aur unko dekhte hain ki kaise woh system ko step by step use kar rahe hain. Observe kar rahe hain aur uske madhyam se aap pata lagate hain ki kya-kya dikkato ka saamna unko karna pad raha hai. Toh evaluators walk through the user interface step by step to identify potential issues in the users cognitive flow. Example ke taur par evaluating an online bank transfer process analyzing whether users can easily understand and execute the steps of transferring money bade aasani se toh kya woh saare steps ko bade aasani se follow kar pa raha hai jaise bank account login karna uske baad phir account agar added nahi hai toh account ko add karna ya without account add kiye kuch paise daalna waghera-waghera kitne aasani se jo bhi scenarios ho sakte hain kitne achhe se unka mulyankan kar pa raha hai. Kaise kitne achhe se woh un saare karya ko kar pa rahe hain. Woh cheezein hum cognitive walk through ke madhyam se dekhte hain. Toh

iska fayda yeh hai ki it helps uncover issues that might be missed in other evaluation and focuses on the user's mental model during interaction. Ki kyunki hum yahan par directly apne upyogkarta ko dekh rahe hain. Woh kaise use kar raha hai, kaise aage badh raha hai, kaise uska flow hai us madhyam se hum unke mental model ke madhyam se dekh sakte hain. Unka interaction system ke saath kaisa hai aur kaise apne karya ko woh kar pa rahe hain. Unko karya karne mein koi step aisa toh nahi unko dikkat ho rahi hai. Jaise kya unko account add karne mein dikkat ho rahi hai? Kya unko account dhoondne mein dikkat ho rahi hai? Kya unko efficiency code dhoondne mein dikkat ho rahi hai? Kya unko ek tarike se kuch jo bhi guideline hai bank transfer ke usmein dikkat aa rahi hai? Toh ek tarah se jo steps hain select a specific task to evaluate walk through the interface as a user would noting challenges. Identify potential cognitive obstacles for the users. Cognitive walk through mein hum yeh bhi dekhte hain ki designer jo karta hai present an aspect of the design and use scenario. An expert is told the assumption about the user population context of use and task detail. Toh one or more expert walk through the design prototype and with the scenario. So expert will guided by three questions. Toh will the correct action be sufficiently evident to the user? Will the user notice that the correct action is actual mein available hai? Will the user associate and interpret the response with the action correctly. So as the expert work through the scenario they note the problems aur phir aapko batate hain aur usi ke madhyam se aap unko fix karke aage badhte hain. Jo agla tarika hai mulyankan ka agla method hai survey aur questionnaire ke madhyam se aap apne jo bhi upyogkarta hain unka feedback ko lete hain, collect karte hain. Alag-alag tarike se structured question ho sakte hain to assess their satisfaction and experiences. Jaise sending a survey to user of a fitness app to gather feedback on the app's usability and the feature jo bhi upyogita aur functions hain unke upar aap survey ke madhyam se feedback lete hain. Unke vichar ko janne ki koshish karte hain. Toh uska jo fayda hai kuch is prakaar hai. Toh yeh cost effective hota hai ek tarah se a large number of jo aapke upyogkarta hai unse lenne ke liye. For example aap online survey form bhej sakte hain. Ghar baithe-baithe jitne bhi user hain, woh is form ko fill kar sakte hain. Can be conducted remotely door se jaisa ki humne bataya making it accessible to the diverse user group. Jaisa ki humne bataya ki mulyankan ke liye, development ke liye, user ki feedback ya unki zarooraton ko janne ke liye humein usmein vividhta laane ki zaroorat hai. Yeh make sure karna padega ki jitne bhi possible set of users hain, upyogkarta hai, woh aapke development process ke dauran, aapke mulyankan process ke dauran, feedback taken, feedback lenne ke dauran uska part rahe aur usmein aapki madad karein. So it helps identify trends pain point and the user expectation. It provides structured data that can be easily analyzed. Toh survey ke madhyam se zyada tar aap alag-alag agar MCQ ke madhyam se le rahe hain. Ek tarah se close ended questions ka response le rahe hain toh unko analyze karna bahut aasan tarike se hota hai. Aur jo open ended questions bhi hain unko bhi aap agar aap sahi tarike se pooch rahe hain structured tarike se pooch rahe hain toh unko bhi aaj ke time par khaastaur jahan par bade bhasha model bade achhe se karya kar rahe hain wahan pe kaafi aasani se aap uska vishleshan kar sakte hain aur alag-alag pattern nikaal sakte hain. Eye tracking toh ek tarah se ek aur tarika hai jiske madhyam se aap evaluation karte hain. Khaastaur pe yeh wahan pe use hota hai jahan pe aap apne user ko dekhte hain ek lambe

samay tak ke liye. Kaise woh apne alag-alag parts of the interface ko dekhta hai. Jaise agar hamara ek for example passport seva ka website hai jahan pe aap passport apply kar sakte hain. Naye passport ke liye aavedan de sakte hain. Apne passport ko renew kar sakte hain. Alag-alag jo functionalities possible hai woh toh ki aap ek tarah se user ke aankhon ke movement ko dekhte hain. Woh kidhar dekh raha hai, kahan pe dhoondh raha hai, kahan pe zyada samay laga raha hai, kahan pe usko dhoondne mein dikkat ho rahi hai. Yeh saari cheezon ka woh dhyan deta hai. Toh aap yeh sochenge ki bhai real life mein zyada tar scenarios mein eye tracker toh hota nahi hai. Kaise aap pata chale pata karenge ki aapka jo upyogkarta hai kidhar dekh raha hai. Toh ek achhi baat yeh hai ki kai research aisa indicate karte hain jo aapke mouse ka movement hota hai ya aapke haath ka jo movement hota hai jab aap interact karte hain apne web pages se ya interface se jaise is case mein main yahan pe yeh pen chala raha hoon toh aap dekh sakte hain ki mere eyes ka jo movement hai ya eyes jo tracking woh particularly abhi is word pe dekhte hue ja rahi hai. Jaise where they got confused or distracted. Abhi yeh dekh raha hai benefits. Phir hum benefits ke baare mein dekhte hain. Provides precise data on how user interact with the interfaces visually and identify area of retention, distraction and confusion. Toh ek tarah se ismein ek bada achha correlation hota hai. Aapka mouse movement cursor kidhar hai? Aapka jo touch ho raha hai, touch point hai, woh kidhar hai? Aur jahan bhi aap touch karte hain ya dekhte hain mouse cursor hota hai. Woh ek tarah se aapka eyes udhar ki taraf hi dekhta hai. Toh is tarike se aap dekh sakte hain ki jo aapka upyog karta hai, woh kidhar dekh raha hai? Kidhar uska dhyan hai? Aap kya aap unka dhyan us taraf kendrit karna chahte hain? Jidhar kendrit karna chahte hain, udhar dekh raha hai. Jaise aapki website pe ek news chal raha hai. Sale 50% off this items are out of stock or going to be out of stock order just one left waghera-waghera. Toh kya aapka jo upyogkarta hai uska dhyan udhar ja raha hai ki nahi ja raha hai? Kyunki us tarah se news dene ka purpose hai ki aap udhar dhyan dijiye aur probably agar khareedna hai toh khareediye ya jo bhi offer chal raha hai uska fayda lijiye. Usi tarike se agla jo evaluation method hai think aloud protocol. Ismein aap jo aapke user hote hain unko to verbalize their thoughts while interacting. Jab aap system ko use karte hain toh hum apne upyogkarta ko bolte hain aap batate rahiye kar kya rahe hain. Jaise hum interview ke dauran koi prashn poochte hain toh student bolta hai main kar raha hoon. Bhai kar kya rahe ho yeh toh batao kaise aap us process ko dhoondh rahe ho? Kaise us prashn ka uttar kar rahe ho? Toh ek tarah se think aloud mein yeh hota hai ki aap apne jo user hote hain unko bolte hain aap batate rahiye aap kar kya rahe hain while interacting with the system. Taking insight into their decision making process. Jaise agar maine bataya ki aapko yeh bank bank account number hai. Ismein itne paise daalne hain tab aap bataoge kaise karoge? Toh jaise aapne bolenge sabse pehle maine login kiya. Uske baad main add account pe payment pe gaya. Payment mein phir add account kiya. Add account karne ke baad maine account detail daala. Phir IFSC code dhoondha aur is account ko verify kiya. Kahin yeh fraud toh nahi hai. Uske baad is account ko add kiya. Toh ek tarah se aap batate jaa rahe ho kya raha hai? Aur is verbalization process ke dauran aap yeh bhi jaante ho ki uska thought process kya hai? Woh kaise woh kaise is karya ko apne diye hue karya ko kar raha hai. Woh sahi direction mein jaa raha hai ki nahi jaa raha hai ya kya karya karne mein usko badi dikkat ka saamna karna pad raha

hai. Toh a user probably explain their choices as they navigate through a video streaming service helping identify cognitive bottleneck ya jaise bank money transfer ka maine example diya. Iske fayde jo hai offer detailed insight into users behavior and the mental process and help understand why user made a certain choices or decisions. Toh iske jo steps hain woh is prakaar hain. User complete the task while speaking their thought aloud. Researchers observe and analyze the reasoning behind the user actions. Kya soch ke unke thought process kya chal rahi hai? Kya woh soch rahe hain? Jab woh koi decision le rahe hain uske basis pe hum agar kahin pe galti kar rahe hain toh kis wajah se galti kar rahe hain woh hum unke explanation aur verbalization ke dauran samajh sakte hain. Toh agla jo evaluation method hai remote usability testing. Kyunki aisa possible nahi hai ki aapke paas jo possible user hain woh aapke paas hamesha ho. Toh involves user testing the product in their natural environment while the researcher observe their interaction remotely. Toh agar woh aapke paas nahi hai toh aapko but best case mein chahiye hona chahiye jo bhi aapne utpaad seva banayi hai woh natural setting mein use ho in the wild use ho. Agar aap wahan par nahi hai toh aap usko remotely ek tarah se observe kar sakte hain, dekh sakte hain. Jaise conducting remote usability testing of a home automation app where participants can control smart devices in their home. Toh iske jo fayde hain it allows the user with users in different location. Alag-alag jagahon pe jo bhi hai phir bhi kaafi natural aur less artificial setting mein less artificial setting than lab setting mein usko bade achhe se uska mulyankan kar paate hain. Toh agla evaluation ka jo method hai woh accessibility guidelines ko check karna. Kya woh accessibility guideline jo government ke dwara set ki gayi hai woh fulfill ho rahi hai ki nahi ho rahi hai? Jaise hum alag-alag accessibility guidelines ko pichle kuch saptah mein humne uske baare mein jaana. Jaise WCAG web content accessibility guideline one of the most popular guideline hai accessibility ke liye. Toh kya yeh guideline ka paalan ho raha hai ki nahi ho raha hai? So guidelines can be used as heuristic for evaluating a website. Toh isko hum uske madhyam se check karte hain. Toh government and the large corporation have to make their website accessible by law. Toh wahan pe choice nahi hai. Aapko isko follow karna padega. Guideline ko follow karna padega. Toh yahan pe chaar key concept hote hain. Perceivable, operable, understandable and robust. Toh iske madhyam se hum ek tarah se uska mulyankan karte hain. Hum web analytics ke madhyam se bhi dekh sakte hain jo ki long term mein ek tarah se jo alag-alag analytics karte hain. The form of interaction login by analyzing users activities on the website. Jaise aap agar aap kisi website ko own karte hain toh is tarah ki statistics aap dekhte honge ki kis page pe kitna attention hai. Similarly videos ke liye bhi aap dekhte hain ki ek YouTube ka video hai toh video ke kis part mein zyada logon ne replay kiya usko hum bolte hain replay value. Kis part ko zyada dekha toh woh important part hota hai. Toh is tarah se aap wahan pe aap probably advertisement daal sakte hain. Kyunki aisa toh nahi video har jagah daalein. Equal space pe daalenge kyunki har part zaroori nahi ki equally important ho. Toh aapka jo advertisement dene ka dekhne ka chance hota hai woh kam ho jayega. Toh again alag-alag tarike ke jo vishleshan hai uske madhyam se aap pata kar sakte hain aur jo advertisement ka placement hai ya important information ka placement hai woh bade aasani se bade achhe aur sahi jagah pe rakh sakte hain. Toh designers use the analysis to improve their design when design don't meet

user need, they will not return to the site and they become one time user jo ki hum nahi chahte. Hum nahi chahte ki keval jo user hai woh keval ek baar aaye uske baad dobara kabhi na aaye. Hum chahte hain woh baar-baar aaye. Hamari services ko hamare utpaad ko baar-baar use karein aur baaki logon ko bhi bolein ki aap bhi isko use kariye. So web analytics enable designer to track the activities of the users on their site. Kaise woh use track kar rahe hain? Kaise fayda le rahe hain. Kis cheezon pe woh zyada samay laga rahe hain. Kahan pe woh zyada galti kar rahe hain? Kya cheezein achhe se kar rahe hain. So they can see how many people come to the site. How long they stay and where they go. So web analytics offer a designer the big picture about how their system performs based on their user activity. Ek tarah se yeh one of the most well known analytics hai jo ki use hota hai. So, agla hum predictive models bol sakte hain jo ek tarah se so provides a way of evaluating products or design without directly involving user. Hence less expensive than user testing aur predictive modeling ke through ek tarah se pata laga paate hain ki kis part mein dikkat hone ki sambhavna zyada hai. So usefulness limited to system with predictable task for example voice mail system, smartphone and dedicated mobile devices. So based on the expert error free behavior. So Fitts' Law jaise bolta hai ki the time to point to an object using a device is a function of a distance from the target object and the object size. Toh yeh humne pehle bhi padha hai. Toh Fitts' Law ek tarah se kitna iske madhyam se hum pata kar sakte hain ki hamare object ki placement kahan pe honi chahiye aur ki uski size kya honi chahiye. So the further away to further the further away the smaller the object the longer time to locate it and to point it in particularly useful for determining where on a screen to position toh yahan abhi humne just bataya. So Fitts' Law is useful for evening system for which time to locate an object isn't. Agar woh kaafi critical time hai jaise smartphone aur handfree tricks etcetera mein toh aapko usi hisaab se unki placement karne ki zaroorat hai. Toh ab humne jaan liya alag-alag evaluation types kya hai? Alag-alag evaluation methods ke kya hai? Toh chaliye ab jaante hain mulyankan ki maapni kya honi chahiye? Toh what are the evaluation metric? Is baare mein hum jaante hain. Toh evaluation metric in Human Computer Interaction are essentially for assessing kaise aap inka maapan kar sakte hain? Usability upyogita, prabhavsheelta and overall user experience of a system. So metric help in understanding how well a product meet user needs and the expectation. So they are used in formative and summative evaluation. Jaisa ki humne shuruwat mein baat ki vikasatmak and ek tarah se summary jo evaluation wala hota hai evaluation development ke baad hota hai. To guide the design process and validate design decisions. Toh ek cheez Peter ne badi achhi boli thi. What gets measured gets managed? Agar aap kisi cheez ko naap hi nahi sakte toh ek tarah se aap nahi bata sakte. Agar aap logon ne Oppenheimer movie dekhi hogi toh kaise unhone atomic bomb ko banaya woh controlled way mein woh us bomb ko pehle isliye nahi banana chahte ki unko pata hai ki agar isko hum measure karke sahi tarike se nahi kar payenge toh iske testing ke dauran hi yeh poore world ko khatam kar dega. Toh is wajah se isko control tarike se karna bahut zaroori hai. Aur jab aap usko control karne ka mathematical formula aur alag-alag tarike se aur isiliye unhone woh experiment tab tak nahi kiya jab tak ek tarah se unhone uska mathematical tarike se usko control karne ka solution nahi nikaal liya. So what gets measured gets managed. Toh is wajah se agar aapko pata karna hai

ki aapka system upyogi hai, aapka system user experience ko badhata hai toh usko measure karna padega. Usko batana padega. Aur agar nahi measure kar pa rahe hain toh woh unpredictable hoga. Woh kabhi achha karega, kabhi bura karega, kuch upyogkartaayein khush honge, kuch upyogkartaayein dukhi honge. Toh depend karta hai ki kaise log usko use kar rahe hain. Toh is wajah se efficiency humein dekhne ki zaroorat hai. How quickly and accurately users can complete a task. So ek tarah se hum measure karte hain the time it takes to user to complete an online shopping check out process. Toh ek tarah se kitna kushal hai. Kitna prabhavshali hai. So how well the system support user achieving their goal? Jo usko karya karna hai woh kaise kar pa raha hai? Kitne sahi tarike se kar pa raha hai? So evaluating how successfully users can find and select a flight on airline website. Kitna woh satisfy hai aapke system ko use karne ke baad. Toh users perceived satisfaction with the product's usability design and overall experience. Example ke taur pe aap dekh sakte hain. Using SUS system usability scale survey to evaluate satisfaction of a newly designed app. Toh evaluation metric in HCI ek tarah se isi ke around hai. Toh usability metric hai, user experience metric hai, performance metric hai, cognitive behavior, error, biometric aur social metric hai. Chaliye hum inke baare mein ek ke baad ek sabhi ko janenge. Toh chaliye sabse pehle chalte hain evaluation metric usability ke baare mein. Toh yeh ek tarah se maapta hai kaise kitna kushalta purvak aur prabhavshali tarike se jo aapka upyog karta hai aapke system se interact kar pa raha hai aur apne karya ko kar pa raha hai toh ismein key metric hai ek tarah se ki success rate task success rate so percentage of successfully completed task kitne task ko woh success safaltapoorvak kar pa rahe hain. Jaise maine usko bola ki bank account add karna ek task hai. Transfer karna doosra task hai. Ek account ko dhoondna toh alag-alag jo bhi task hai usko kitne ko kitne achhe se sahi tarike se kar pa raha hai. Time on task kisi bhi karya ko karne ko usko kitna samay lag raha hai error rate kitni galtian woh kar raha hai us karya ko karne mein efficiency time taken to complete a task kitna jaldi aur kitne kam samay mein kar pa raha hai aur learnability kitna aasan hai ek naye user ko task perform karne ke liye so measuring the time it takes for a user to navigate through a banking app to complete the money transfer iska example hai agar hum agle user experience ki baat karein toh yeh evaluate the subjective experience of user interacting with a product. Toh jo bhi aapka upyogkarta aapke system ko use kar raha hai uske anubhav ko hum maapne ki koshish karte hain. Us anubhav ko maapne ke liye aap satisfaction score kar sakte hain. Jo ki overall rating given by the user for their experience. Net promoter score hota hai jismein aap jo system ya utpaad use kar rahe hain usse bada khush hai. Aap kitna chance hai ki aap kisi aur ko recommend karte hain usko use karne ke liye. System usability scale a standard questionnaire that gives a usability score. Toh us jo standard questionnaire hai usse usko fill karate hain aur janne ki koshish karte hain. Engagement frequency and duration of the user interaction with the system. Agar aap usse satisfy nahi hai toh aap us pe wapas nahi aayenge aur usko zyada der tak use nahi karenge. Toh engagement bhi is wajah se ek achha evaluation metric hai user experience ke liye. Emotional response. Toh user feeling and emotions after using the product. Toh ek tarah se hum dekhte hain ki kitna khush kitna emotionally khush hai woh. Toh again yahan par SUS jo questionnaire hota hai uske madhyam se hum jaan sakte hain ki kaise e-learning platform jo

aapne banaya woh kitna upyogi hai. Toh agar hum performance metric ki baat karein toh performance metrics ka jo focus hota hai woh batana hota hai ki overall jo system hai woh kitne achhe se karya kar raha hai in terms of speed, accuracy and reliability. Toh kitna tez hai, kitna sahi hai aur kitna reliable hai. Toh uske jo key evaluation metric hai, response time kitna samay lag raha hai system ko apne upyogkarta ko response dene mein kitna system lag raha hai system ko start hone mein ya page ko load karne mein? Kitna accurate hai jo bhi output aaya hai woh dekhne mein woh evaluate karne mein. Down time the frequency and duration of the system fail. Jab system fail hota hai, kitne der tak ek tarah se aur kitni baar woh unavailable hota hai, woh dekhne ki zaroorat hai. So measuring response time for a voice command in a smart home system. Jaise aapne usse kuch bola kuch poocha toh turant nahi bol deta probably woh kuch second ya kuch millisecond lagata hai usko samajhne mein, process karne mein, phir usko uttar dene mein. Cognitive aspect agar hum dekhein toh cognitive metric ke liye kitna mental effort lag raha hai user ko kisi karya ko complete karne mein ya navigate karne mein toh jo key metric yahan pe hai mental effort amount of cognitive resource needed to complete a task usko kitna sochna pad raha hai kitna mehnat karna pad raha hai recall accuracy ability to remember and use features after a long time agar jo aapne usne pehle feature use kar rakhe hain agar usko dobara diya jaata hai toh kitna jaldi se aur kitna achhe se woh kar pa raha hai kitna jaldi usko recall kar pa raha hai the cognitive load the mental effort required during the interaction often measured through eye tracking or subjective rating scale. Is madhyam se aap cognitive load nikaal sakte hain. Kitna scale pe diya hai. Time to recover agar galti ho jaati hai toh kitna jaldi woh usko recover karta hai. Punah start karta hai. Toh evaluating the cognitive load of a medical professional using a complex patient management software. Behavioral agar evaluation metric ki baat karein toh yeh observe karta hai user ke actions ko aur usse woh pata lagane ki koshish karta hai alag-alag interaction pattern ko. Toh yahan pe jo alag-alag evaluation metric hai, click rate hai, navigation path hai, drop off rate hai, heat maps hai. Toh heat maps ek tarah se visual tarika hota hai. Jahan pe dikhata hai kahan pe zyada tar logon ne click kiya, kahan pe zyada tar logon ne scroll kiya. Kahan kis area pe zyada focus diya gaya hai? Eye tracking ke madhyam se, mouse ke madhyam se aur cursor ke madhyam se. Is wajah se click rate mein jaise number of times you click on a specific element. Toh kis part ko zyada click kiya gaya hai ya agar hum video ki baat karein toh kis part ko zyada dekha gaya hai waghera-waghera. Navigation path the path takes through the website or an app. Kis path ko zyada tar user ne follow kiya hai. Kis flow ko zyada tar user ne follow kiya hai apne karya ko karne ke liye? Toh example ke taur pe dekhte hain. Using heat map to see where user frequently click on a news website highlighting navigation pattern. Is wajah se toh isi tarike se agar hum error ki baat karein toh error evaluation metrics focus karta hai yeh dekhne mein ki jo alag-alag type ki galtiyan hoti hain aur unki frequency jo bhi hoti hai woh kitni hai system ko use karne ke dauran use samvaad karne ke dauran aur iske jo alag-alag evaluation metric hai kitna jaldi-jaldi kitni frequently error aa raha hai error severity kya chhoti galtiyan aa rahi hai badi-badi galtiyan aa rahi kyunki do chhoti kehte hain na ki 100 lohar ki ek sonar ki toh kabhi-kabhi ek badi galti 100 chhoti galtiyan se bhi zyada khatarnaak hoti hai. Aur error recovery rate agar galti ho jaati hai toh kitna jaldi woh recover kar paata hai

woh humein dekhne ki zaroorat hai. User frustration index. So level of frustration associated with the errors. Again alag-alag tarike ke survey se aap isko measure kar sakte hain. So analyzing the user analyzing their frequency while filling out an online form noting where user make the most mistakes. Agar hum biometric ki baat karein toh biometric evaluation metric involve tracking alag-alag tarike jo physiological responses hain to evaluate the user experience particularly for emotion and stress level. Toh ismein alag-alag metric ho sakte hain. Woh eye movement ho sakta hai. So track where user look and for how long kahan pe woh dekh raha hai aur kitni der tak dekh raha hai. Heart rate changes in the heart rate indicating stress and anxiety. Jis tarah ka research bolta hai toh kahin aisa toh nahi aapne ek bada difficult sa paragraph de diya aur bol diya ki iska meaning batao. Toh obvious si baat hai thoda sa stress anxiety toh aa hi jaayegi. So galvanic skin response GSR yeh bhi ek tarah se emotional arousal ko skin conductivity ke madhyam se measure karta hai. Toh yeh bhi ek bada important ek tarah se evaluation metric hai. Aur facial expression aapka kehte hain na ki chehra aapka darpan hota hai ki aapke andar kya chal raha hai. Jab aap khush hote hain toh probably aap ka chehra khushnuma dikhta hai. Aap dukhi hote hain toh aapka chehra utra hota hai. So facial expression analyze the micro expression to gauge the emotion during the interaction. Jaise aap koi baat kar rahe hain, koi karya kar rahe hain aur cheezein nahi ho rahi toh frustrate ho jaate hain. Sar peet te hain. Toh us tarah ka aap dekh sakte hain ki facial expression ek bahut hi achha darpan hota hai ki jo aapka upyog karta hai woh kiske through jaa raha hai. So using GSR sensor to measure user stress level during a virtual reality simulation. Toh woh cheezein aap dekh sakte hain. Aur social ki baat karein toh social metric focuses on evaluating user behavior in collaborative environment on social media social system jaise collaboration efficiency ease with which user can collaborate using the system communication clarity effectiveness of communication tools within the interface social presence feeling or connected during the interaction engagement in groups how often or effectively user engage in social feature toh ek tarah se hum dekh sakte hain example ke taur pe evaluating collaboration efficiency in a project management tool used by the team for a task coordination. Agar kisi project ko aap is platform ke through kar rahe hain toh kaise jo uske alag-alag team mates hain, group mates hain, aapas mein coordinate kar rahe hain, karya ko kar pa rahe hain, toh woh uska indication deta hai. Toh agar hum wapas punah apne pet project pe aate hain Braille learning app pe toh kaise hum uski uska evaluation kar sakte hain. Toh similar jo bhi tarike humne dhoondhe ab hum dekhte hain ki yahan pe kaun se applicable honge aur unko hum kaise kar sakte hain. Toh Braille learning app designed for visually impaired student need to be evaluated to ensure accessibility kyunki hum kiske liye bana rahe hain jo dekh nahi sakte toh yahan pe accessibility ko evaluate karne ki bahut zaroorat hai. Kitna woh prabhavkaari hai kyunki usko prabhavkaari toh hona hi padega. Otherwise agar woh sahi nahi karega toh phir koi matlab nahi hai accessible banane ka aur woh saral hona chahiye prayog mein. Toh yahan par jo evaluation methods use honge usability testing, heuristic evaluation aur survey ho sakte hain. Toh humne dekha hai ki observe visually impaired student using the app to navigate the learning interface. Toh, hum ek tarah se dekhte hain kitna upyogita hai iski. Kaise woh kar pa rahe hain, karya kar pa rahe hain. Heuristic evaluation, apply accessibility heuristic. Jaise humne bataya tha

alag-alag principles hote hain. Hum check karte hain ki woh unmein hai ki nahi hai. Jaise screen reader hai for compatibility to ensure the app meets guideline aur alag-alag jo humne WCAG aur baaki design principles ke baare mein evaluation aur usability principles ke baare mein baat ki toh woh saari meet ho rahi hain ki nahi aur connect feedback from the user about their experience, satisfaction and the difficulties. Aur finally aap in cheezon ko dekh ke sun ke unko apne agle version mein incorporate karte hain aur naya banate hain. Toh iska jo outcome aayega refining features based on the feedback such as simplifying navigation adding clearer audio instruction jo aapko ek tarah se feedback mein mila. In dono for example in teeno cheezon ko aapne naye version mein incorporate kiya add kiya aur punah saari evaluation ki dekha ki ab khush hai ki nahi. Toh obviously jo user satisfaction hoga woh badhega. Toh think aloud protocol yahan pe students ne Aditya Armani ne use kiya. Toh aap dekh sakte hain user verbalize their thoughts while performing the task providing insight into their decision making process. Kaise woh isko use kar rahe hain, kya kar rahe hain, woh yahan pe darshaya gaya hai. So, users of a learning language learning app are asked to verbalize their steps as they attempt to complete the lesson. A set of users who are instructed to execute various task to check the accessibility and affordance of the interfaces. Toh is tarike se aap dekh sakte hain. So jo user hota hai, woh apne task ko smoothly kar paata hai while with intuitive interfaces that meet their needs. Aur one user face initial confusion but successfully completed the task after brief. Toh response time yahan pe dekhiye yeh aaya. Bend time detection yeh aaya. Average accuracy yeh aayi aur 4000 bend without significant wear. Toh ek tarah se aap dekh sakte hain ki alag-alag tarike se yahan pe inka mulyankan kiya gaya hai jo project student ne banaya aur remote usability testing ke liye user perform task from their own environment while researchers observe and record the interaction remotely jo humne remote usability testing seekhi thi woh kiya gaya. So AB testing yahan pe kiya comparing two versions of the design to see which one performs better in terms of user behavior and the outcomes and testing two different landing pages design for an e-commerce website to measure conversion rate. Is tarah se AB testing bhi hum yahan pe kar sakte hain. Hamare case mein humne do glove ke design banaye aur unka mulyankan kiya. Kisko log zyada pasand karte hain. Toh Braille learning app jo humne bataya tha ki jaise humne bataya ki yahan pe humne do low-fi models banaye. Jaise ki pehla model yeh banaya option A jahan pe wearable glove with the flex sensor to detect the finger fold buzz and haptic feedback iske drawback the aur doosra option jo humne banaya ek tarah se yeh tha jismein model use skin friendly adhesive bolt jaise yahan pe jo dikh rahe hain and tensile wire to detect finger pull based on the wire tension toh humne yeh banaya aur iske bhi kuch drawbacks the. Usability testing ya jo bhi alag mulyankan aap karna chahte hain, uske madhyam se aapne decide kiya ki jo option B hai woh zyada better hai. Yahan pe jaise reason diya gaya hai wearable gloves with the flex to detect the finger fold buzz button vibration and haptic feedback. Toh characteristics yahan pe hai button vibration to gently nudge user buzz to provide input output audio feedback and it offers comfort and continuous tactile engagement toh ek tarah se ismein evaluation mein alag-alag tarike ke challenges bhi ho sakte hain. Jaise sahi jo upyogkarta hai sahi jo stakeholder hai usko bhi choose karna bahut zaroori hai. Agar aap sahi user ko select nahi kareng woh galat tarike se evaluation

karega, mulyankan karega aur aap sahi tarike se jaanch parakh nahi kar payenge ki usmein koi galat galti hai ya dikkatein hai ki nahi hai. So it can be challenging to find user who represent the target demographic especially for the niche applications. Resource constraints hamare paas hote hain. Evaluation can be resource intensive in terms of time, money and manpower. Kabhi-kabhi humein feedback aur innovation ke beech mein ek samanjasya baithana hota hai. Toh too much focus on evaluation feedback can hinder creativity and innovation as designers may become overly focus on user suggestion. Designing realistic test scenario. Yeh bhi ek bahut bada challenge hai. So, creating scenarios that accurately reflect how users will interact with the product in real life is essential but difficult. Evaluator setting evaluator has different levels of control in the lab initial setting and crowd source evaluation setting toh aap kaise aap unko handle kar rahe hain data collection data ko collect karna evaluation user experience ke goal ke mutabik bhi ek challenging aur engagement ke liye task hai. So crowd source quality control jab aap crowd sourcing ke madhyam se alag-alag door baithe upyogkartaon ko apne evaluation mein involve karte hain toh kabhi-kabhi hamara unpe ek tarah se control nahi ho paata hai. Hum proper due check nahi kar paate hain. Toh a large number of participant can be recruited using AMT or run experiment with internet that are quick and expensive. Toh ek tarah se sahi participant ko lena aur unka sehmati lena bahut hi difficult hai. So person need to be told aur isliye unko batane ki zaroorat hai ki aapka right kya hai? Aap is mulyankan mein aur aap iski sehmati ke bina hum kuch nahi karne waale. So participant need to be told why the evaluation is being being done and what will be asked to do and informed about the rights. So informed consent form provide this information and act as a contract between participant and the researcher. So the design of informed consent form and evaluation process data analysis and storage method scientifically approved by higher authority. Jaisa ki humne baat ki thi pichle ke saptahon mein ki institutional review review board hote hain jo ki poore experimental design ko validate karte hain aur ensure karte hain ki aap neetigat tarikon se sahi tarikon se jo bhi data collect kar rahe hain. Chahe woh mulyankan ke liye ho, chahe unke feedback ke liye ho, chahe improve karne ke liye ho aur usko kaise store kar rahe hain, kaise use kar rahe hain, in sab cheezon ka dhyan deta hai. Toh jab bhi hum in data ko consider karte hain, interpret karte hain toh hum dekhte hain reliability ko, validity ko, ecological validity, bias aur scope ko. Toh hum in baaton ka dhyan dete hain. Does the method produce the same result on separate occasion? Ideally hona chahiye. Validity does the method measure how it is intended to measure ecological validity. So does the environment or the data distort the result. Kahin aisa toh nahi ki woh badal raha hai environment ke hisaab se. So bias are the bias that distort the result. Kahin bias ki wajah se badal toh nahi raha hai. Toh is tarah se how generalize toh ek tarah se agar hum summary dekhein toh evaluation is a critical part of HCI to ensure that products meet user expectations are usable and solve real world problem effectively. Kaise prabhavshali tarike se hum jo real world problem hai unko solve kar rahe hain aur jo aapke upyogkartaon ki zarooratein hain woh apne product ke madhyam se poorn kar rahe hain. So different evaluation type humne discuss kiye formative summative diagnostic and deerghkaalin and alag-alag technique humne baat kiye usability testing heuristic evaluation and eye tracking. Toh ek tarah se yeh alag-alag purpose

serve karte hain alag-alag stages mein product development ke. And the choice of technique depends on the product stage, user needs and the resource jo bhi aapke paas available hai. Jaisa ki humne yeh bataya ki aapko apne participant ki rights aur unke consent lene ki zaroorat hai. Unko unke right ke baare mein batane ki zaroorat hai. Toh IRB aur jo neetigat tarika hota hai data collection ka mulyankan ke liye chahe aur anya feedback ke liye woh batana zaroori hai. So it is essential not to over generalize finding from any evaluation. Aur generalize karne ki zaroorat nahi hai. Jitna jaise karya kar raha hai utna hi batane ki zaroorat hai. And yeh cheezon ka dhyan dete hue last mein hum yahi bolenge. So user feedback is the fuel that drives design improvement. Kyunki jab tak hum user feedback ko nahi lenge hum design improvement hai woh hum kar hi nahi sakte. Jaisa ki Jared ne bola tha. Agar hum last mein batana chahein toh field studies are evaluation studies that are carried on natural setting. Aur jaisa ki humne bataya mulyankan ke liye zaroori hai ki aap lab setting mein control setting mein kariye lekin uske beyond aapko in wild setting mein natural setting mein bhi karna bahut zaroori hai. Aur humne yeh bhi discuss kiya sometime the finding in the field study are unexpected especially for in the wild studies that explore how novel technologies are used by participant in their home. Piece of places of work or rights outside. Humne evaluation metric ke baare mein baat ki thi. Critical in assessing system usability, performance and overall user experience and the choice of metric depends on the product stage, development, user goals and the evaluation objective. A combination of quantitative and qualitative metrics gives a comprehensive picture of how well the product made the user needs. Aur uske madhyam se hum bata sakte hain ki yeh jo product aur seva aapne banayi hai woh kis had tak aapke upyogkartaon ki zarooraton ko poorn kar rahi hai. Unki aashaon ke anuroop hai aur aapne jo daave kiye hain apne product ya seva ke baare mein woh kitna sahi hai. Toh additional material ki baat karein toh hum tutorial karenge evaluation ke upar. Hum Adobe Illustrator Adobe Express ke baare mein aapko hands on experience denge aur finally assignment denge jiske madhyam se aap dekh sakte hain ki aapne jo kuch seekha unka mulyankan kar sakte hain. For further readings you can refer to these additional material. Aap inko dekh ke inke baare mein padh ke aur bhi jaankari le sakte hain. Isi ke saath is saptah mein hum aapse alvida lete hain aur aasha karte hain hum aapse jaldi milenge agle saptah mein. Dhanyavaad. [Sangeet]