

Chat from Amy J Ross Talk - How do NASA space suit engineers apply human centric design?

June 2020

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Questions:

- How does NASA work on researching new galaxies, stars etc.
- At the docking on Sunday we heard an exchange about some not-quite-closed zippers on one of the suits. What does this say about the UX of the suits?
- Are the new suits from Tesla pressure suits for use outside of vehicles?
- What are the differences that identify what is necessary for the new suits
- Are the EVA space suits you design the same as body formed space crafts? How do they differ from a flexible spacecraft?
- How much does one spacesuit cost?
- what will be the maximum pressure the suit can bear
- What are the differences that identify what is necessary for the new suits
- Can you speak to some surprising or interesting differences in designing for Lunar EVAs? Does crew get to weigh in on considerations for crew autonomy?
- What challenges did you have with dealing with touchscreens?
- You mentioned that you learned about human factors/user experience on the job. Can you give an example of something you learned on the job in that regard?
- Are the EVA suits that are actually used in space water proof? Are they identical to the ones you see in water training tanks?
- Do you have any funny or dramatic anecdotes about designing space suits?
- How much does what you do draw from the great work of the designers and seamstresses at Playtex?
- What different tests do you run the suits through?
- Do you take inspiration from Climbing suits (hiking) and Scuba suits (diving)?

- Space is unforgiving and I wanted to ask about how the team works to prioritize features that are critical versus nice to have? And how do those decisions affect final production?
Thx!
- Suits contain communications, cooling, and psi, heat shields, ... my question...what were all those ports and hoses on the outsides of the Moon Suits...was it for the outside of the spacecraft ?
- How can non engineers apply to work at NASA?
- how many times a man experience sunrise and sunset when they are in INTERNATIONAL SPACE STATION
- Are the suits one time use only?
- Is it hard to see through the visor or is it like the buses with printing over the windows and you can see through the pixels.
- How many layers is the spacesuit?
- UX designers worked on interface for the Latest space mission....is the technology attached to their leg while in the cockpit an actual iPad...I was assuming they would have some sort of upgrades to their tech devices?
- How are space suits tested, and how did the original designers figure out what the suit should do and should not?
- Do you have a certification body you trust for space applications?
- Do the astronauts have a back up suit? Do they have interchangeable parts? Ie: Different pants for different assignments
- Can you talk about the discovery / interviewing / testing process with actual astronauts? How involved do they get throughout the design process?
- What are the ways that you and the teams addressed the predicament of flatulence?
- What are the similarities between Arizona and the moon?
- Every astronaut has a different job function, do you design suits for their job function, or do you design one a suit for all?
- What are the special challenges of designing a suit for the moon vs space, eg. regolith?
- Other than size, are there any differences in the suit for men and women astronauts?
- Can you do some sort of google glass type interface? Voice activated/commands or gesture controlled?
- I'm wondering if there is any reason for the space suit to be white? Any considerations?
- Do you get to wear the suits too?!
- Are there any differences for the suits for women? What are the considerations there?
- Do you apply Aesthetics in designing suits?
- I'm interested in learning more about Playtex and research history. Where should I look? Don't suppose anyone wrote a book?
- Do you guys have to do finished products in a clean room?
- for the return trip back to Earth, does everyone change into an "orange" suit ?
- how easy or difficult is it to make modifications in the suit after tests?
- Are space suits mass manufactured or built with extreme customization? I see approaches where you are considering anthropometrics for mass manufacturing but also working with model/body scans for customization

- Who could be a spacesuit designer? A physicist? Or someone with a design background?
- Have you seen “For All Mankind”, and if so what do you think of their technology/suits?
- Any UX research internship opportunities at NASA?
- Did you find any challenge that was particularly hard to find a solution to when it came to offering the best fit/experience for these astronauts?
- Have you ever failed?
- How do the approaches differ to suit design?
- Can I assume Safety is the number one factor to consider with spacesuits with Efficiency/Mobility/Usability being second?

Comments related to Amy’s talk:

- I LOVE the metaphor of us as BOTTOM DWELLERS beneath a sea of atmosphere!
- Acceptance Criteria: Keep human alive.
- I LOVE that she refers to -154C as “shady”
- Wow! So cool!
- Non-classical-UX user testing is always so cool to hear about. <3
- We do user testing for users in space but we don’t for all the users on earth yet still - irony :D
- I AM IN AWE - SUPER EXCITED and AMAZED by her presentation and wealth of information & knowledge. You can tell she lives and breathes this stuff! In my next life, I’m going this route! #kudos
- I love her enthusiasm - she is passionate about her craft - lesson learned!
- her passion is contagious! :)
- Ohhhhh best believe, being an astronaut is on my bucket list now for sure. If not in this life, certainly for sure in the next one, Lord willing. I’m very intrigued.
- TEST, TEST, TEST ... #powerful!
- YES - Vomit Comet!
- Wearing the suit gives them empathy for the user
- Anthropometrics, yes
- I am loving all the correlations and metaphors ... helps me understand and visualize the problem statement better.
- WOW!!!! So much in depth thought that goes into this.
- I swear I want to be this enthusiastic in presenting findings - AUTOMATIC BUY-IN!
- Test As You Fly/Fly As You Test
- In deep water you can test movement in 3 planes, great test environment
- @Amy Ross - you, ma’am are a ROCK STAR! I really enjoyed this! #Brava
- Congrats on the recent launch/flight and this was my favorite zoom ever! Thank you :)
- Thanks Amy. It’s been so enlightening.
- Fellow UND Space Studies here! Thank you for the wonderful talk!

- Thank you, Amy, for an amazing presentation. Two of my favorite things in one night, space and UX!
- I 'm her fan now, she have so much passion about her job and how they do it... can be here listening her like...for hours
- Very Big Thank You for putting this talk together!! What an honor to learn from Amy Ross this evening!! Such great information, insights, and knowledge...Truly inspiring!
- This has been great, thanks so much Amy and the UX Research and Strategy team for organising
- Thank you so much Amy! This was such a great presentation. Thank you UXRS for another fantastic event!
- Thank you so much! I have to bow out now! I appreciate you making this accessible to others outside your state!!
- This was really cool, thanks for the inspiration! Have a good night folks
- A BIG THANK YOU to Amy Ross for this wonderful, informative and deep presentation. UXRS team - Thanks a-lot for organizing this event. Learned alot from this special domain which is rare to acquire for normal UX practitioners.
- Very inspiring! Thank you for your time Amy J Ross Thank you UX R+S team. This has made my day/month/year. I was not able to go to Nasa to meet Amy last year due to not being a US citizen.

Links shared:

- Elon Musk's SpaceX Suit Is Like a Tuxedo for the Starship Enterprise
<https://www.nytimes.com/2020/05/27/fashion/SpaceX-Dragon-Suits.html>
- The documentary is called Moon Machines...Space suits was episode 5 of 6
- <https://youtu.be/FBK7FYg6rXY>
- Also, the NASA S.U.I.T.S program is a UI/UX space suit challenge. I participated while in grad school, a really great experience.
<https://microgravityuniversity.jsc.nasa.gov/nasasuits.cfm>
- I work on a UX team at NASA Ames. Feel free to email me at m@whoismacy.com with questions!

Matt Karakilic: White was chosen for a few reasons. One of the most important reasons is that white reflects heat so that the astronaut doesn't get too warm. Astronauts can get too cold as well, but that is usually in their hands. Therefore, the spacesuits have heaters in their gloves. Another reason spacewalkers use white spacesuits is that white is visible against the black background of space, so other astronauts can easily see the spacewalker. In addition, since spacewalking astronauts always go out in pairs, one of the suits always has red stripes in four places so the other astronauts can tell one spacewalker from the other. Inside the spaceship,

astronauts get to wear clothes more like those you wear every day, and they can even help pick the colors.