I Am a Systems Engineer and I Do…
Jess Korzeniowska

Why did you choose to be a Systems Engineer?

Picture this: a young spacecraft Engineering student starting her third year; yet to find a subsystem she has a particular affinity for, or that she's interested in enough to dedicate the rest of her working life to. The start of an unfamiliar module on 'Spacecraft Systems Engineering' with a charming nearly-astronaut lecturer, who makes a joke about Systems Engineers being the 'know-it-alls' of projects. I decided I quite liked the sound of that and was pretty much grabbed from that point on. In those early days, Systems Engineering seemed a good mix of puzzle solving, logical sensible processes, organising, and big picture thinking – all things I enjoyed - while avoiding getting bogged down in the miniscule dull technical details of subsystems. Cut to me papering my uni room walls in revision post it notes, having my housemates time me to put the correct activities in the correct project phase, and which project review went where. From then I went to being a graduate trainee systems engineer in the European Space Agency Education Office, which cemented that it was the kind of work I wanted to be doing, and afterwards switched industry to fusion, taking the Systems Engineering skills with me to the UK Atomic Energy Authority.

What education/qualifications do you have for Systems Engineering?

I graduated from the University of Southampton with a MEng degree in Aeronautics and Astronautics specialising in Spacecraft Engineering. I had done a work experience week on an air base with the Women in Science and Engineering (WISE) Campaign as a teen, which is what switched me on to an aero degree in general. Then I made the link to a life-long love of space (read: Star Trek), and the Astro part took over, leading me eventually into the spacecraft Systems Engineering realm. Having spoken to other systems engineers I realise my path into it straight from university is quite rare, but Systems Engineering is so integral to the life of a spacecraft that I didn't realise there was anything unique or different about it; it was presented as 'if you want to build a spacecraft, this is how you do it'. In fact, it was only when I left ESA that I had the thought 'wait, there are organisations that DON'T use Systems Engineering?!'.

A key part in my career journey, whilst not official training, was the summer I spent in America as a summer camp science teacher. If you can convince hangry 5-year-olds to be interested in testing for acids with cabbage water, with spaghetti, slime, and goodness knows what all over you, a fierce panel of Systems Engineering critics doesn't seem nearly as bad. At the time, I didn't realise how important the skills of engaging different audiences, communicating difficult concepts simply, and not taking yourself too seriously, would be to my engineering career.

What is it about Systems Engineering that you find so compelling?

When people say Engineering is all about problem solving, Systems Engineering is what I imagine they meant: looking at all the different functions or elements of a system, trying to understand where and how they relate, where they don't, what hasn't been considered, what is interacting with them, what do they need to enable them. Taking all these different puzzle pieces and working to form a coherent picture. I love that as systems engineers we can take engineering out of the physical and into the abstract – it enables me to be creative while still having an appreciation for the complex and exciting technology we are working with. I love being able to walk into a room to help people work

on removing a huge breeding blanket from a fusion power plant and saying to them 'ok don't think about that – first let's think how you'd remove a segment from an orange'. I get a lot of satisfaction from helping unearth aspects about a system that were unknown or as yet undefined through using all the tools available through Systems Engineering. It feels as if all these solutions to complex problems are there waiting patiently to be discovered, if only you use the right methods or look at them in an unexpected way.

What advice would you give a systems engineer just starting out in their career?

Often, I hear from young people at outreach events how worried they are about pigeon-holing themselves into a particular discipline early on in their career or being stuck in something they don't like. To both them and people considering making a career switch, I'd say that Systems Engineering gives you the opportunity to work across so many different industries and types of technology, that you can end up with very varied experience and have a lot of options. That is even before you've started looking at the breadth of activities within Systems engineering itself. It is a good discipline for being flexible and keeping things fresh with new challenges, so be sure to make use of that opportunity.

Don't underestimate the huge people element that is needed alongside the technical elements of Systems Engineering. Communication, negotiation, and emotional intelligence around situations are all key. In a lot of industries, like fusion, where the use of Systems Engineering is quite new, there is a large education and influencing piece that needs to be done in parallel to any technical work. These kinds of skills are crucial to that, and in turn ensuring that the organisation gives its overall support and investment to develop the Systems Engineering capability.