International Women in Engineering Day



International Women in Engineering Day (INWED) began in the UK in 2014 as a national campaign from the Women's Engineering Society (WES). Since then, it has grown enormously, receiving UNESCO patronage in 2016 and going truly global the following year. INWED promotes the amazing work that women engineers across the globe are doing and gives them a profile when they are still hugely under-represented. As the only platform of its kind, it plays a vital role in encouraging more young women and girls to take up engineering careers.

The Influence of INWED

INWED is International Women in Engineering Day, occurring on 23rd June every year. It is only in its 10th year, was relatively unknown in its early years, nor celebrated in the way it is today.

Safety engineering is still largely a man's world, as with engineering more generally. Yet, there are some women who have been in the field (and associated disciplines such as reliability engineering, human factors and systems engineering) for decades, challenging that status quo, finding their own niche, working on sites and in offices all over the UK and far beyond. They have contributed substantially in highly regulated sectors far and wide and to projects of many types, from small widgets to major infrastructure. In this article, a different perspective is therefore presented – specifically, that of the SCSC women. Here's a snapshot of their stories, in the form of short interviews.

"I would like to be remembered as someone who was not afraid to do what she wanted to do, and as someone who took risks along the way in order to achieve her goals."

Sally Ride

The responses to interviews have been unexpectedly but conveniently themed into those who accidentally fell into safety, those who gravitated towards it, and those who wanted to be involved in it from the outset.

Accidental Careers!



Ireri Ibarra, Global Head of Functional Safety, Dana Incorporated

How did you get into safety?

I was trying to find a research topic for my thesis, then I stumbled upon safety. Safety sounded interesting, at the same time terrifying given how broad the subject is. It turned out to be a great area to make a career in.

"Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may be fearless"
Marie Curie

What would you highlight in your career to date?

It's difficult to choose a single highlight to date. I feel most fortunate for continuously being challenged to develop myself both technically and personally.

My current role has given me the opportunity to explore how cultural aspects impact organisations. From the early days as an international student; I learned and observed how big, diverse, and interesting our different cultures are. Today I have a global responsibility leading a multi-cultural organisation adapting to change. The result of several acquisitions led to the merging of different companies and their cultures, this in turn, made me take an interest on how people perceive and manage risk. I've had to learn that even if we agree to disagree, as long as the goal is common, we must move together in a positive direction.

Tell us about a current challenge you face?

An organisation with many stakeholders from very different backgrounds, both in their personal and working cultures. Reaching consensus is perceived as a simple task but, it is essential to be able to navigate an array of cultural nuances. Communication plays a big role in establishing a common understanding of the problem at hand; eventually encouraging people to propose or accept potential solutions; instead of dismissing them straight away.

I have gone through the whole cycle of doubting myself, wondering if I'm doing anything right, nearly giving up. In the end if you break your patterns and genuinely think outside of the box; all of these dark clouds become lighter.

Give us some wise words….

Be comfortable outside of your comfort zone, be yourself, ride the wave and enjoy it.



Carmen Carlen, Director of Safety Products, Edge Research (Germany)

How did you get into systems safety?

I had no intention of working as a safety engineer. I even did not know exactly what safety engineering was until I attended a seminar in the final year of my Bachelor studies, where I had to write a report on safety cases. Afterward, fate made it so that at my workplace I had to implement an editor for safety cases. Also, I was sent by my then-employer to the group of Professor Tim Kelly, at the University of York, to learn more about safety cases.

What would you highlight in your career to date?

The highlight of my career so far is that I did some research in the domain of safety case development and maintenance for about 10 years, contributing to the state-of-the-art, and now, while working on projects with industry, I get to transfer my research contributions into practice.

Tell us about a current challenge you face?

I am currently working on the development of trustworthy autonomous systems, scoping at reducing the epistemic and aleatory uncertainty associated with such systems, operating in complex environments.

Give us some wise words …

As safety engineers, we need to be suspicious and consider all worst-case scenarios. Still, we shall keep an open mind and think of solutions for enabling the usage of new technology, for which we still have not specified mature enough safety assurance practices.



Rhiannon Chilton, Software and Systems Dependability Specialist, DSTL/MOD

How did you get into safety?

By complete accident, although it played well to my personality. My early career moves were driven by fixed term contracts and redundancy before I discovered testing, safety, and assurance. Having said that, all of the industries I have worked in have been safety critical or safety related. I have always liked to feel that I am making a positive difference.

What would you highlight in your career to date?

I have been lucky to work on a number of very tangible platforms throughout my career and feel proud to have done so, protecting the various users and other stakeholders. Unfortunately a number of them aren't for open conversation but I love being able to see the output of hard work and (often difficult) decisions. More than once I've been privileged to find my way onto the bridge of a ship and see the navigation system I contributed to in action.

Tell us about a current challenge you face?

Balancing family and professional life is definitely a challenge, learning how to prioritise is a key skill(!), but it is incredibly rewarding to be part of both worlds.

Give us some wise words….

Value your enthusiasm and integrity. Nowhere is perfect all of the time but work takes too much of your life for it to not be fulfilling or for it to compromise your beliefs. The path forward may not be obvious, I never dreamt I'd have worked on most of the things that I have done, but there are so many areas where good people can make a difference.

Catherine Menon, Principal Lecturer, University of Hertfordshire



How did you get into systems safety?

My PhD was in category theory, and following this I moved from Australia to the UK to take up a postdoc at the University of York. Systems safety had been on the periphery of my experience – some of my PhD work touched very briefly on it – but I hadn't dived into it in any detail.

What would you highlight in your career to date?

I've recently begun to move into the intersection of ethics, safety and regulation. I'm pleased to be a member of the BSI committee working on ethics for robotics and autonomous systems. We've recently put out the updated BS 8611 standard which attempts to guide practitioners in this space. I've also been lucky enough to be involved with developing other standards and guidance documentation – not least the guidance produced by our own Safety of Autonomous Systems Working Group! I've also very much enjoyed working as a consultant to the MoD to get some more hands-on experience: the gap between theory of systems safety and how an 18-year-old squaddie "does" systems safety can certainly be eye-opening!

Tell us about a current challenge you face?

I'm currently involved in a number of cross-disciplinary collaborations to consider how safety and ethics interact when it comes to public-facing systems. The major challenge here is the public perception of autonomous systems as "magical" robots with science-fiction capabilities. I think as safety engineers there's a hugely important opportunity for us to speak up here and help educate the public about the risks and benefits provided by these systems.

Give us some wise words….

As safety engineers, one of our roles is to tell "the story of the system". Don't overlook the importance of narrative and argument, especially when it comes to public discourse systems safety is a very nuanced discipline, and the way we discuss systems should reflect that nuance.

Rita Dunne, Principal Consultant, Atkins

How did you get into systems safety?

I didn't consciously choose a career in safety. It chose me. I joined Rolls Royce and Associates (Nuclear) on graduating in Maths and was ushered into a huge room with many other new starters on the first morning, where we waited to be called to our departments. Each person's name was called out followed by the department they were joining. It was a total mystery to me where I would be heading – and where I would fit in to an engineering business with a Maths degree? In hindsight it was odd that I had no idea what department I was going to! Then someone called out my name followed by "Safety!" and I immediately knew this was going to be interesting and worthwhile. And it was.

What would you highlight in your career to date?

A really special time in my career was working for NATS (then our client) on the transition of Air Traffic Control (ATC) operations from the old to new Heathrow ATC Tower. I worked with an amazing group of human factors specialists and Air Traffic Controllers on what felt like the most exciting and innovative engineering/human-centred project in the UK at the time. I learned so much and to be part of a project that had international reach was thrilling.

Tell us about a current challenge you face?

It's a challenge – and saddening – to observe that organisations have such short memories when it comes to safety. Lessons in safety we may think have been learned decades ago are rarely embedded to the degree we may expect or hope. I wonder how the Grenfell disaster could have been allowed to happen when society knows so much about how to identify, eliminate and manage risk effectively. And I wonder what it will take to change our society's approach to safety so such disasters can never happen again.

Give us some wise words....

Working as a safety professional involves asking lots of questions that don't have easy answers and I have experienced the safety team being treated as a hindrance to project progress for that very reason. So my "wise words" are to keep asking those questions, even if the response from others is not comfortable. Your questions may save someone's life.

And apart from that, I rather like our late Queen Elizabeth's wise words "Take the long view".

Gravitational Forces!



Zoe Garstang, Engineer and STEM Ambassador, BAE Systems

How did you get into systems safety?

I wouldn't say it was pre-planned when I first embarked on my career. I joined BAE Systems as an engineering apprentice in 2016, and at the time, I didn't really know where I wanted to specialise. It was only by chance that I was assigned a placement in Airworthiness as part of my apprentice rotation and that started to give me a glimpse to some of the possibilities in system safety. It wasn't until the start of this year that I actually moved into a system safety role on the Flight Control Systems, after spending 3 years in Airworthiness.

"Life is not easy for any of us. But what of that? We must have perseverance and above all confidence in ourselves."

Marie Curie

What would you highlight in your career to date?

One thing I'd highlight in my career so far has been the variety, not least throughout my apprenticeship, but also continuously on a daily basis. Don't get me wrong, there have been lots of changes to adapt to in a short space of time, but in that time, it has also meant that I've gained a broad understanding in different areas and can see how they all interlink or affect one another.

Tell us about a current challenge you face?

I think the biggest challenge for me right now is coming up the steep learning curve in my new role. It's been a big challenge and there's so much to learn but it's one that I'm excited about.

Give us some wise words….

If you're a student or early in your career, where you can, try and give everything that you come across a system safety context or link. Specific system safety modules and topics are hard to come by in general engineering courses and I'd not seen system safety covered in the same depth as other topics within my academic career (BTECs, HNC and HND). I suppose what I'm saying is – get curious about system safety, even if it's not directly related to your role or studies at the moment.



Anusha Chellappah, Senior Safety Engineer, Ebeni

How did you get into systems safety?

During my undergraduate degree, I took a couple of HMI related modules, which I really enjoyed. These modules got me interested in Systems Safety which led me to choose a research Masters focusing on Safety Critical Systems, specifically Traffic Collision Avoidance System (TCAS). Together with my supervisor, I wrote a paper based on the results of my findings and the paper was chosen to be published by the IET. The field interested me and I was determined for my career to be in safety.

Soon after my MSc, I joined Logica's (now CGI) Graduate scheme. I started out as a tester in a Defence project but kept emphasising to my team lead that I wanted to be involved in Systems Safety. I approached the Safety Manager at the time (Mike Parsons!) and requested him to be my Staff Manager so that he could guide me to the right projects. Mike was very supportive and did all he could to get me involved within the safety teams of different projects and that is how I started out!

What would you highlight in your career to date?

I have been lucky enough to have been involved in a few interesting projects but my favourites to date were two projects I worked on in parallel.

I was a part of the Technical Contractor (TSC) team supporting the Office for Nuclear Regulation (ONR) during Generic Design Assessment (GDA) Steps 3 and 4 for the UK HPR1000 (a type of nuclear reactor). This involved me working directly with the ONR inspectors in charge, taking part in Level 4 meetings with the Requesting Party and reviewing documents against International Nuclear Standards. This was the first time I had been involved in the Nuclear domain and I gained a lot of knowledge from my peers and by working closely with the clients.

I also worked as a junior Independent Safety Authority (ISA) on Four Lines Modernisation (4LM). This involved me initiating meetings with London Underground (LU) and Thales, producing Safety Notices to record observations and drafting letters of Support for software commissioning.

I gained an incredible amount of technical knowledge on both these projects.

Tell us about a current challenge you face?

Most of the projects I was a part of had been running for a number of years, which makes it at times difficult to gain exposure to the initial safety activities e.g. being involved in creating Fault Trees. Also, there is a steep learning curve to get familiar with the project in a short period of time, particularly for complex projects.

Give us some wise words….

I was incredibly lucky in terms of the companies I worked for (CGI, Altran Praxis (now Capgemini) and now Ebeni) as I always felt supported as a female engineer and a parent and have always had a good work/life balance. So I would say to any woman, who is looking for a career in engineering to not let the lack of women in engineering or perceived work load put them off and to keep pursuing their passion.

Marea de Koning, TUNI (Finland)

How did you get into systems safety?



I intend to live my life by always moving forward and making choices that allow me to bring meaning to that which is important to me. Originally, I never intended to work in academia, let alone pursue a career related to systems safety and heavy-duty off-road machinery. My journey into systems safety wasn't pre-planned, it appeared as I progressed from my Bachelors in technical computer science from Amsterdam UAS in the Netherlands, to a Masters in Industrial engineering in Aschaffenburg UAS and from there moved forward towards Finland. It was in Finland that the concept of systems safety appeared as I became a PhD researcher in the department of Automation Technology and Mechanical Engineering at the University of Tampere. My journey is proving to be very exciting, one filled with many blessings and revelations as every day I discover and learn new aspects in this world of systems safety.

What would you highlight in your career to date?

One aspect that I would like to highlight is my ongoing appreciation for all the mentors that I have encountered up until now, all of whom have given me guidance, and advice that has proven to be truly fundamental for my personal and professional development. I would like to mention that, whatever journey you find yourself on, do not remain in isolation and try to do everything on your own; instead, reach out and share your knowledge, experiences, and learn from those around you – let it help others as it helped you.

Tell us about a current challenge you face?

I'm still very new to the safety field, but it is my aim to design, develop and integrate inherently safe design measures into the highly-automated heavy-duty off-road machinery that we are developing in close collaboration with several Industry partners. One of the current concerns addressed is the design, integration and validation of the safety-critical software-related parts of a safety function, especially when said function exceeds the scope of existing guidelines e.g. due to the incorporation of data-driven methods.

Give us some wise words …

I would like to share the immortal words of C.P. Cavafy "Keep Ithaka always in your mind. Arriving there is what you're destined for. But don't hurry the journey at all. Better if it lasts for years..."

Louise Harney, Chief Systems Specialist, Leonardo



How did you get into systems safety?

I joined a consultancy called Helios when I left university and they happened to have lots of safety work, which I found incredibly interesting. Managers regularly offered me the opportunity to do other kinds of work, but safety kept pulling me back in as it gave me the big picture. I moved into industry to get more involved in the end-to-end lifecycle of systems, which led me to me joining a new network in the SCSC and I never looked back.

What would you highlight in your career to date?

One of my career highlights has been working on the Tempest programme. For a time, I chaired the safety sub-group bringing together the safety leads of each Tempest partner organisation to facilitate knowledge sharing and ensure that close working relationships were maintained. The opportunity to learn from each other and start the partnership off as we mean to go on was a big highlight for me. It reminded me of the importance of soft skills in addition to technical skills, as workshop facilitation and safety communication are such key parts of being a good safety engineer. As an SCSC Steering Group member, I have found the ability to network and share ideas with peers has been invaluable, and I try to replicate that support in any team.

Tell us about a current challenge you face?

There are so many technical and design challenges, which is what makes working in safety so interesting. My biggest challenge at the moment is adapting to my new life as a working mum, especially in between two periods of maternity leave with our second baby already on the way. I've had to delegate more than ever, both at work and at home, to make the balance work. I have shared more knowledge with others than ever before, to ensure that our team can cover my role until I return, and I have enjoyed rising to the challenge.

Give us some wise words …

You can make an impact with a single conversation, so always be open to finding those opportunities to engage, whether it's with a system designer, a fellow safety professional, or anyone else.

Jenny Butler, Senior Safety Consultant, Ebeni



How did you get into systems safety?

It certainly wasn't pre-planned. My partner was working for a, then, very small company that was pioneering in system safety (this was 1988); formal methods were then being mooted as potentially a big thing, and I was coming to the end of my university degree course in mathematics. I was taken on as a new graduate, and learned about system and software safety as I went along, working with and learning from some very knowledgeable and experienced people along the way.

What would you highlight in your career to date?

I count myself fortunate to have been able, for the better part of 35 years and counting, to do work that I (mostly) enjoy, find interesting and be able to do it well – with the added bonus of great colleagues and clients. Perhaps the most satisfaction is when clients come back for further work!

Tell us about a current challenge you face?

I work part-time and have done for 14 years now. It can be challenging to manage client expectation around that.



Gill Kernick, ARUP

Here is a slightly different take on getting into safety, from Gill Kernick, who presented at the recent SSS on the Grenfell Tower accident.

How did you get into safety?

I don't really think of myself as 'in safety'. I fell into leadership and culture in the space of safety by a winding and unpredictable route. I'm fascinated by the complexity of preventing catastrophic events, where the social aspects such as hearing all voices is as important as the technical aspects.

What would you highlight in your career to date?

I have worked with some incredible teams to make dramatic improvements to safety performance by focussing on the gap between work as prescribed, done and imagined; and creating psychologically safe spaces and connections between executives and the front line to talk freely and safely about these gaps.

Publishing "Catastrophe and Systemic Change: Learning from the Grenfell Tower Fire" is a highlight although it's also, and always will be, the book I wish I'd never had to write.

Mostly, the highlights are memories of beautiful human interactions all over the globe.

Tell us about a current challenge you face?

About a year ago I started working as Transformation Director at Arup University. Learning how to navigate organisational complexity and politics in a large organisation is challenging and interesting. I'm particularly intrigued by how to bring kindness to my interactions and leave people with an experience that they matter even when things are challenging! I believe this is critical to creating a culture where people will speak up and tell you the bad news – something I'm passionate about nurturing.

Give us some wise words….

Particularly to women – don't try and fit the 'mould' – it's a biased model. Challenge the status quo – your perspective is unique, trust it.

The Chosen Path

> **"A ship in port is safe, but that's not what ships are built for."**
> **Grace Hopper**

Anne Seldon, Chief Engineer, Product Safety & Compliance, WAE



How did you get into systems safety?

I've wanted to work in the safety sector since I started studying engineering at university. Originally, I was keen to work in the air accident investigation space but I found my passion was for preventing such accidents from ever occurring in the first place. I was very fortunate to find a role in aviation safety shortly after graduating and I've continued to work in this space for the rest of my career.

What would you highlight in your career to date?

I'd say the career highlight for me was seeing the Boeing 777X take to the sky for its very first flight. I had worked on the safety and reliability case for the electrical systems on the aircraft for the best part of four years. Its complexity and scale challenged me more than anything I'd faced to date and required me to learn quickly and increase my technical knowledge dramatically. Seeing the aircraft's wheels leave the ground was an amazing reminder of why I became an engineer.

Tell us about a current challenge you face?

In the past year I've moved from working in a single industry, aerospace, to working in an organisation which works across multiple sectors. Whilst the principles are the same, the application of them differs from industry which is something I've never had to manage previously. To add to the complexity, I'm helping to design battery systems to decarbonise mining vehicles and they're operating at a power level that is transitioning to high voltage levels within occupied vehicles. There's very little standardisation and best practice to support us in this endeavour so it makes things much more challenging!

Give us some wise words…

Engineering can be a cruel mistress at times, and it will often demand increasingly more of your skill, time, and energy. Ensure you maintain a healthy balance. You can't advocate for the safety of your systems effectively if you're not maintaining your personal wellbeing.

Helen Smith, Lead Safety Engineer, Leonardo



How did you get into system safety?

I spent the early part of my career in the Supportability function, performing reliability predictions, FMECAs (Failure Modes, Effects and Criticality Analysis) and Fault Trees on a variety of complex products. Fault Tree Analysis (FTA) is a type of failure analysis in which an undesired state of a system is examined and I found that my analysis always tended to steer me towards what could go wrong on a system rather than assuming it would operate as designed. I've always had a big interest in accident reports and the ways in which the experts piece together all the evidence to find out what really went wrong, so I chose to use the

Challenger Space Shuttle disaster as my case study when I was interviewed for my Chartered Engineer qualification. After working in Supportability for around 7 years, there was an internal vacancy for a System Safety Engineer and I jumped at the chance to specialise in this area.

Tell us about a current challenge you face?

Part of my current role within Leonardo's Design Integrity function is acting as an Independent Technical Authority for complex, multi-box systems. As our systems become more complex, the traditional methods of proving they are safe become more problematic. As I had no prior involvement in the specific system development, my initial challenge was to review all the safety evidence for the system and sub-systems and form a judgement as to whether the safety requirements were appropriate and the system had attained an acceptable level of safety. A subsequent challenge was when I identified a shortfall in the safety argument or the evidence, as I cannot compromise my independence regarding the advice or feedback I provide to the project team.

What would you highlight in your career to date?

I would say that the main highlight of my career to date actually forms one of the core parts of my current role, where I have been given the delegated authority to sign the UK and EU Declarations of Conformity for our products that require the UKCA (UK Conformity Assessment) and/or CE (European Conformity) marking. It's just one part of my role that I take very seriously, as I'm taking the full responsibility for the product's compliance with the applicable UK/EU Laws. Prior to this, I received training on the legislation and underwent a competency assessment, so being given this delegated authority shows the confidence that Leonardo has in my knowledge and ability.

Give us some wise words…

Start each morning with a positive thought, and it can change your whole day!

As for me? Maybe one day I'll write an autobiography, but this'll do for now…



How did you get into systems safety?

I'm a case where it was probably inevitable. I've been doing safety since day one of my career, but the origins go further back. I was born the same week as the Aberfan disaster and my brother passed away on a June 23rd in the 1960s of hydrocephalus, shortly before safe shunts became available – INWED has thus become a welcome event in my life. The Chernobyl accident (and various other industry accidents) happened during my physics degree, so with a view to stopping anything like it happening again, my career began in the nuclear sector at UKAEA. I started as a safety analyst on Sizewell B, then on the UK's first civil SMR project (SIR, Safe Integral Reactor), followed by the UK's first computer-based nuclear plant trip system (for Dungeness B). The latter was where I really got into systems and functional safety, at a time when software reliability was in its infancy. I was trained by renowned experts in the Safety & Reliability Directorate (SRD), then part of UKAEA, and in 1992 was relocated to SRD to work on submarines. The rest is history.

What would you highlight in your career to date?

Top of the list is when I was elected a FSaRS. At the time I was only the 4th woman in 40 years to become one; and was shortly followed by a few others.

Of course, next on the list is being a co-author of SCSC's book "30 Years of Safer Systems"!

I would also highlight

- early on in my career, setting up a new regional office that became very successful
- starting a new team from scratch and getting us to £2.5m turnover within 2 years
- setting up global communities of practice in two companies
- the sheer number of projects and bids I have worked on in various sectors, including some fairly novel projects (not all of which came to fruition!)
- working all over the UK, also in Lithuania, France and Australia, and remotely in various other countries
- being a founder member of a LinkedIn group for Women in SET that now has ~18,000 members

Tell us about a current challenge you face?

My favourite challenges in industry have tended to involve "projects in distress", including ones where a regulator has refused an application for operations – sometimes there's nothing quite like a challenge being brought in after the event and sorting out scores of corrective actions!

Recently, it was a career diversion, leaving industry and spending a couple of years in a university research post in fusion. I had previously been a reviewer for the RAMI (reliability, availability, maintainability, inspectability) work on ITER's I&C (Instrumentation and Control) systems, but this was more safety focused. It well-utilised all my previous industry experience from various sectors.

At time of writing my current challenge is simply getting a job. Despite calls to arms for over-50s and women engineers in leadership positions, I've found it very hard to get a job if you're disabled, need to work part-time and/or can't travel. This is despite the fact when I was working full time in industry I was often working on several projects and bids in parallel, and remotely and internationally. Going the freelance/associate route seems to be the only way to deal with the situation. Watch this space?!

Give us some wise words ...

Always have a Plan B. Being a safety engineer is a reasonably secure livelihood, but don't assume you'll never be made redundant, get ill/incapacitated, or have some other work or life hazard thrown your way!

Don't be afraid to do the right thing. Don't put up with discrimination or unacceptable behaviour. Whistleblow on conflicts of interest. Don't let people put you down or push you around. Be prepared to walk away or go to court. Make things better for those following in your footsteps.

Remember to look up at the stars and not down at your feet (Stephen Hawking).

Final Words

> **"Your best and wisest refuge from all troubles is in your science"**
> **Ada Lovelace**

If you wish to know more about how women in systems safety work and can add value to teams, projects and company culture, invite them into a meeting, put their CV into a bid, give them a platform at a conference or on a panel, put them on a high-profile project, propose them for a board. Give them a place at the table, give them an opportunity, give them half a chance, let them be at their best, and they will often reward your team/company (and your company's finance department) ten times over – oh, and when they do, please ensure that they are appropriately compensated for their efforts and expertise.

Well, we hope you have enjoyed reading this article for INWED. This article is dedicated to all the women engineers working in safety, their allies in the workplace, and their supporters behind the scenes. Also, Women in Science and Engineering (WISE) and WES.

See you on Ada Lovelace Day, for a special historic edition of women engineers in safety. In the meantime, take a tip from the Safety & Reliability Directorate's old motto – leave nothing to chance!

Wendy Owen

Wendy has nearly 35 years' experience in systems assurance across a wide range of highly regulated industries covering energy, defence, transport and process sectors. Her career has largely been in engineering consultancy, also with time in manufacturing and regulatory. She is a Fellow of WES and the Safety & Reliability Society.

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