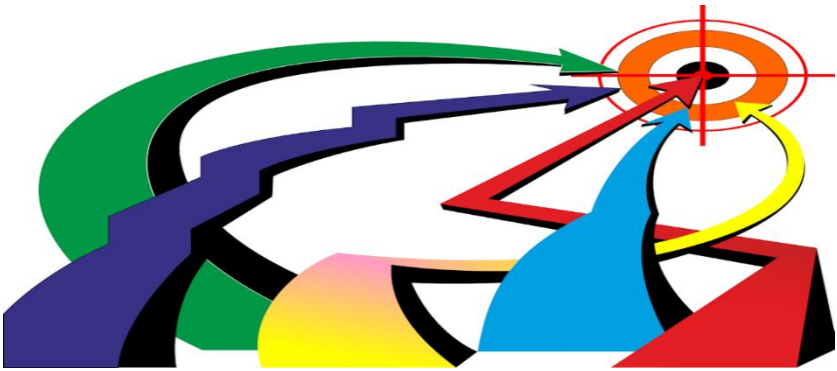
How Do I Get Into Safety?



It is sometimes difficult to plan a career: so many things have to align together for each step on the ladder to take place, whether it is the correct training, organisation, job or assignment, or simply just being in the right place at the right time. We are sometimes asked: "how do I get into safety?"

The answer isn't straightforward. In fact, it is doubly difficult to plan a career in safety engineering, assurance, or consultancy as a solid background in the underlying technologies (such as software, architectures, or databases) and sector knowledge (eg. aviation, nuclear or rail), plus the right opportunities all have to be present

Safety is often a second career, taken on by engineers or consultants who have already got several years of experience doing other things. Also, there is the issue that not many safety staff are required for most jobs: often there is only one safety engineer on smaller projects; if that role is already taken, there is little chance of a junior gaining relevant experience.

With this situation in mind, we continue our series of articles where members of the SCSC Steering Group share their experiences of 'getting into safety'. Some of the routes taken are definitely not linear!

Please read and compare with your own 'safety story'. Of course, these experiences are based on events some time ago, and the situation has definitely improved as the industry has matured. For example, there are now courses (at post-graduate level) on safety-critical systems such as those at the University of York, there are competency frameworks for safety roles, and the SCSC has its own "Safety Futures Initiative" programme with the aim of developing young and early-career staff so that they can take on full safety roles.

The messages that come out of these experiences however, are that sometimes you do just have to be in the right place at the right time, and with the right underlying characteristics. All safety roles require the ability to be able to assess risk, to understand some difficult technical arguments, to follow (and create) workable processes, rules and regulations, to know the standards and guidelines relevant to the job in hand, to be able to communicate well, work in a team with colleagues, and very importantly, to be assertive and take a strong position when needed.

Roger Rivett



I worked for 10 years developing software for engine management systems. In 1990, the department head, on reading an article about applying BS 9000 to software development, decided that the department should work within a software quality management system (QMS). Of his staff at the time, he considered me to be best person to make this happen. Despite my initial reservations, I accepted the new role of software quality manager with the brief to introduce a software quality management system with external certification.

In the same time frame, the MISRA group was formed under the DTI SafeIT programme with the brief to produce an automotive response to the recently issued draft of what became IEC 61508. This led to the publication in 1994 of the Development Guidelines for Vehicle Based Software. I was my company's representative in the MISRA group, this gave me the opportunity to explore the subject in more detail and I found the topic both intellectually stimulating and of great importance to the wellbeing of my company's customers. Consequently, I started incorporating the functional safety recommendations from the MISRA guidelines into the requirements of the software QMS.

When the software QMS was considered to be firmly established, after successfully completing its 3-yearly recertification, I handed over day to day responsibility for it to a member of my staff and focussed on functional safety, as by now this had become my main area of interest. This involved performing hazard analysis and risk assessment on all the electronic control units fitted to the vehicle at that time and developing associated procedures for inclusion in the QMS. Further knowledge and understanding came from regular attendance at conferences, especially the yearly Safety Systems Symposium run by the SCSC, involvement in further DTI and European projects and continuing involvement with MISRA. The latter resulting in the publication in 2007 of the Guidelines for safety analysis of vehicle based programmable systems. During this time, I became the company's Technical Specialist for functional safety and in 2005 I became a founder member of the ISO working group that developed ISO 26262, first published in 2011.

Jane Fenn



Whilst working as a Systems Engineer for BAE Systems, it was noted that I also had a flare for Project Management, so when a safety-critical system displayed some worrying behaviour during rig testing, they asked me to put together a multi-disciplinary team to undertake a full safety assessment and agree a modification programme with the supplier.

During that time, I met people who became mentors and friends, who drew me further and further into the dark arts of Safety Engineering. I became entirely and shamelessly hooked. When a replacement system was planned, I was determined that we would engineer 'in' safety from the outset. Defence Standard 00-55 issue 2 had only recently been issued and we followed that closely, bringing a level of rigour that was unusual at that time. I started to undertake modules of the Safety Critical Systems Engineering MSc course at the University of York, to ensure I was applying latest and best practice.

Needless to say, once that programme was finished, I jumped at the chance when I was offered the opportunity to manage BAE Systems' research centre, the 'Dependable Computing Systems Centre' at York, and in conjunction with Newcastle University; it was my dream job! That allowed me to be involved with and influence leading edge Safety Engineering research.

Subsequent roles included managing industrial research teams, across defence industry, developing modular safety cases, and later, software architectures, as well as managing the MOD-funded pan-defence industry Software Systems Engineering Initiative. My current role is 'Lead Consultant Engineer – Engineering Safety' where I define the Safety Engineering policy, competency and training requirements as well as some of the processes used by safety practitioners within BAE Systems Air Sector.

I dabble in the occasional safety consultancy activity with other Business Units of BAE Systems and support several of the SCSC Working Groups: Assurance Case, Safety Culture, Security-Informed Safety and Safety of Autonomous Systems. And those people who led me astray all those years ago.... some of them are on the SCSC Steering Group today....

Dewi Daniels



I graduated with a degree in Computing Science from Imperial College, London in 1981. My first job after graduation was with Logica. I spent the 1980s developing software that was not safety-critical but was mission-critical. For example, I designed a software product that allowed applications running on VAX minicomputers to interface to airline reservations networks. I was privileged to demonstrate the product to Ken Olsen (founder of DEC) at DECworld '87. I also worked on a secure trading system for the Bank of England.

I first got involved with safety-critical software when I went to work for Program Validation Limited (PVL) in 1989. There, I was one of the developers of the SPARK Examiner. SPARK is still widely used, though the software we wrote has long since been replaced by open-source software developed by AdaCore. I also did program proof for several Rolls-Royce jet engines, including the RB211-535. This was one of the first industrial applications of program proof, as far as I know, and was very labour-intensive, though also very enjoyable (interactive program proof felt a lot like playing Tetris).

In the mid-1990s, I worked for Lloyds Register. I spent 6 months in Atlanta working on the software safety case for the then-new Lockheed C-130J (which is to be retired from RAF service next year!). I also spent 6 months in Paris writing the outline safety case for the European Geostationary Navigation Overlay Service (EGNOS), a precursor to Galileo. In the late 1990s, I worked for Praxis Critical Systems. It wasn't a very happy time for me; Praxis wanted me to do system safety engineering, whereas I was much more interested in software development.

In 2004, I went to work for Silver Software, which was a great company and a great bunch of people. A turning point for my career was when I joined the committee that was writing DO-178C. I greatly enjoyed the experience and made many friends. In 2010, I was headhunted to form Verocel Limited, the UK subsidiary of a US company. I grew Verocel Limited from a one-man start-up to a company with a turnover of over £2 million. I recruited a

great team of software engineers. I also started a company called Aeronautique Associates in 2012 to offer DO-178C training. When I left Verocel in 2015, I decided to do some consulting while I decided what to do next. I've found that I really enjoy being an independent consultant. I particularly enjoy the variety of work. I've worked on some very interesting projects. I led a team that developed an innovative flight control system for an optionally manned rotorcraft. I helped to develop an unmanned air system (UAS) autopilot. I've audited several companies against DO-178C and DO-254. I've always been interested in software processes, so I enjoy seeing how different teams approach software and hardware development. I'm currently helping Vertical Aerospace build an air taxi. My consultancy work has enabled me to do unpaid work that I also enjoy. I'm currently a member of the RTCA/EUROCAE Forum on Aeronautical Software and of EUROCAE WG-117. I'm one of the UK representatives on the IEC 61508 committee. I'm a member of the SCSC Steering Group.

SCSC is my main means of interacting with, and learning from, like-minded professionals. What I particularly value about the SCSC is the mix of industrial and academic members.

Sean White



I have only ever worked as a Safety Engineer so know nothing else – hang-on a minute, as a Safety Engineer you need to know a lot about a lot of things – that's what's kept me enthralled, challenged and motivated over a number of decades.

I started in the role, although I didn't know it at the time, as a fresh faced electronics Graduate, working in the Advanced Engineering Department at Westland Helicopters. Days when integrated modular avionics, fly by wire and active control technologies were in their infancy and safety standards were at best interim drafts. The standards matured and so did my understanding and skills and I still get a buzz seeing a Merlin hovering in the sky.

A move to BAe and fast jets gave me the opportunity to work on Hawk, Tornado, Typhon and best of all Harrier – it must be the hovering thing. A short secondment to Boeing to develop a safety case for the Harrier flap controller and a longer one to Flight Test to support Hawk AJT development were highlights.

I then jumped ship or is that plane to join the NHS, working within a team to establish a safety management system for health technologies. Challenging, frustrating but also very rewarding. I'm now writing national & international standards and training clinicians and technologists in the principles of safety management. Still actively involved in research, investigating how to assure AI technologies for health and medical purposes.

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