

Career Episodes

Career Episodes	Dates
1. Developing a research group Details the work to build a team of researchers during my lectureship	Oct 2009 - present
2. Quantifying Human induced ventilation of Buildings Focuses on a particularly research proposal from bid development through to implementation	Oct 2010- present
3. Programme Leader of Architectural Engineering Design Comments on approaches to leading a interdisciplinary degree programme	Oct 2009 - present
4. Chair of Athena Swan Committee Briefly outlines work to improve gender diverse working practices within the department	July 2013- present

1. Developing a research group

Over the last 4 ½ years I have successfully developed a research team of five PhD students, two members of research staff and built strong long term collaborations with colleagues from across the university. Alongside building a team of researchers I have also developed laboratory infrastructure, securing funding for equipment, acquiring a wind tunnel and laboratory space for the group.

Developing resources

In order to gain the resources to build a team of researchers it was necessary to **identify potential projects and opportunities** for funding. I identified several useful opportunities including: engaging with students on the doctoral development programme, small funding bids for developing collaboration with local universities, engaging with a large European project, and various sources of EPSRC funding for early career researchers and equipment.

For instance, I identified the opportunity to apply for £50,000 to purchase monitoring equipment for buildings. In order to write a successful application it needed to be clear that the equipment was of use to a wide range of researchers. I had to **plan, budget, organise, direct and control tasks**, co-ordinating input from academics across the university whilst based in a remote location. It was necessary to evaluate the requests for equipment from a range of academics against the funder's criteria in order to maximise benefit to the majority of researchers. I had to investigate the most appropriate equipment for a range of tasks (e.g. heat flux meters, energy monitors, temperature, humidity, state, occupancy and thermal cameras) evaluating the technical specifications of a variety pieces of equipment from a range of suppliers that I had no previous experience of. Once the bid was successful I had to run a tender process as we were expecting to purchase greater than £30,000 of equipment from one supplier. I had to evaluate two competing tenders to ensure that fit my specifications and make a decision. Once successful I had to set up a management system for the loaning of the equipment to ensure it was equitably shared amongst early career researchers and that there was appropriate training and monitoring in place for the equipment's use. Through this funding I have connected a wider group of PhD students together who make use of the equipment, holding seminars where they can discuss their research with each other in order to develop a **team spirit**.

B1

C2,C3

Developing and mentoring staff and students

As the team has grown I have become increasingly responsible for **leading and developing staff**. Each research student requires a different type of supervision and it is necessary to **identify individual needs and plan for their development**. As part of the supervision of my PhD students I carry out training needs analyses to ensure they are capable of both completing their PhD successfully and that they develop a broad range of skills for a successful future career. I work with the students to develop timeplans and milestones relevant to their projects, and review these regularly with them, coaching them to develop their own project management skills. I provide continual feedback on their technical approach and also their writing and presentation styles. I carry out annual reviews for the research staff, helping them develop the skills necessary for their research and ensuring they are engaging with opportunities available to them, be that in house training, or attending international conferences. My previous researcher moved onto a large research project at Cambridge University when her fixed term with us was near completion.

C3

Alongside my own PhD students I have also carried out *transfer interviews* for colleagues students in which you review the research plan to ensure it is appropriate for a PhD and realistic to complete within the time frame. As this is the only formal review of the students works before their viva it is important to ensure that a rigorous approach is planned for the research. A **critical** approach is necessary to ensure the project is technically sound, risks have been considered, evaluated and mitigated if necessary and that there is an appropriate plan for completion

C3, C4



D3

For all projects it is necessary to **manage and apply safe systems of work**. One example is assisting my student to develop safe methods for investigating how people adapt their environment in rooms with high levels of CO₂ (3000ppm). In order to ensure she was working safely and not endangering participants I had to guide her through the risk assessment. This included identifying potentially significant risks (e.g. potential for accidental release of greater levels of CO₂ causing asphyxiation of the participants) and guiding her to find a safer solution. I ensured she had a very clear method statement that resulted in a low risk to both herself and the participants that also met with the universities ethical guidelines.

E2

I **identify and agree appropriate research methodologies** with my students and staff. This includes coaching them to develop a robust methodology, providing expert advice, constructive criticism and ensuring the work-plan is realistic yet adventurous. One of my students is investigating the possibility of a building management system collecting data from building sensors to build a predictive model of the buildings. I have guided him towards a methodology that uses real data alongside simulation (Energy Plus) ensuring the results are realistic but enabling the investigation of a wide range of different scenarios. Allowing him space and time to test his own ideas has resulted in him developing strong independence as a researcher. Another student has been

B2,B3

<p>reviewing the performance of two low carbon buildings in Sheffield. Through reviewing, discussing and advising her on her research I have an increased awareness of design solutions and how to evaluate their effectiveness.</p> <p>Engaging widely with other academics</p> <p>In order to develop collaboration across the university it has been necessary to present and discuss proposals for research with a range of colleagues. I believe the most successful example of this is my presentation on the strategic need to consider human activity within buildings to improve simulation / prediction and control. This led to the development of a proposal <i>Adaptive Building Control</i>, combining my expertise in airflow and ventilation with a colleagues in machine learning. Following my initial presentation at an internal event we began developing a proposal and were successful in securing £30,000 from Schneider Electric to support a PhD studentship.</p> <p>The process of developing this research directly engages in the creative and innovative development of engineering technology. Through engaging with control manufacturers, building energy managers and consultant engineers we identified the constraints with the current systems enabling us to exploit opportunities for research by transferring expertise from different disciplines to create a novel building control methodology. I help maintain a sound theoretical approach by providing guidance in building physics, for instance considering the impact of passive approaches (such as natural ventilation and thermal mass) on the performance of a control system. Since our original proposal the team has grown bringing in experts from Control Engineering and Psychology in order to consider the user behaviour in the design of the new system. I have worked hard to engage with a range of disciplines, and particularly to promote the input of Psychology. I believe this range of specialisms is necessary in order to design a new control system that will optimise energy consumption against comfort whilst being usable by those in the building. This interdisciplinary approach is necessary in order to contribute to sustainable development.</p> <p>The growth of my team has been very rewarding, but leading and managing teams was a new experience. Therefore it was clear this was an area where it was clear that professional development necessary to maintain and enhance competence was necessary. As such I undertook training as part of 'Sheffield Leader', a programme in Leadership skills running over 6 months at the University of Sheffield for which you need to be recommended.</p>	<p>D2</p> <p>A2,A1, E3</p> <p>E4</p>
<p>2. Quantifying the Human Induced Ventilation of Buildings</p> <p>I have been successful at securing grant funding through the Engineering and Physical Sciences research council <i>First Grant</i> scheme to run a 14 month fundamental research project “Quantifying the human induced ventilation of buildings” (£124,682). The aims of this project are to investigate and quantify the transient airflow exchange across a doorway due to human behaviour, evaluating the complex air flow patterns generated by door use. This will provide fundamental knowledge about the impact of occupants on air flow exchange, alongside the development of new methods to represent this in CFD models. These models will be valuable to test the performance of local extract ventilation where it is vital to the safety and well being of the occupants.</p> <p>In order to develop the technical research, and write a coherent and successful proposal I had to identify limits of my own personal knowledge in order to access appropriate support and training. It was necessary to extend my track record in computational fluid dynamics, and air sampling to the use of laser visualisations and particle image velocimetry. In order to develop these skills I identified sources of information, individuals who could provide technical and academic guidance</p>	<p>A1</p>

<p>and identified appropriate training sessions in laser safety. Being at the cutting edge of research knowledge is essential in order to create a novel research proposal.</p>	
<p>I conducted appropriate research and development of engineering solutions for the experimental methodology. The experiment consists of a dynamically scaled water bath experiment, with two rooms linked by a door that is opened by a computer controlled actuator. I designed ways to measure the total mass flux using fluorescent dye and designed safe working methods using laser imaging techniques to gather more detailed information of the flow. There were many practical issues to consider in the development of the methodology including: removal of chlorine from the water, creating a safe laser blackout with ease of access for experimental operation, ensuring the flow patterns measured are repeatable and due to the door motion. Although there are existing studies of flow visualisation around doors, there has not been a rigorous study of mass flux between two spaces due to door use and no one has attempted to measure the velocity profiles over the doorway. Although the experimental techniques have been used in other fluid dynamics studies transferring them to a situation with two tanks connected by a moving door is challenging.</p>	B2, E2
<p>The First Grant scheme is capped at £125,000. Therefore in order to maximise the outputs I identified equipment available for loan alongside lasers already available within the department. By evaluating the need of the wider range of research staff for the equipment I managed to secure extra resource from the department to fund purchase and maintenance of equipment. I carried out budgeting for personnel, including my time, technician time and employment of a researcher, setting up appropriate milestones, deliverables and appointment of suitable persons to a steering committee, timetabling meetings at critical points in the project.</p>	C2
<p>On implementation of the project it was necessary to employ a researcher, requiring the drafting of an appropriate job specification, evaluating applications and chairing interviews. On appointment I had to brief the researcher in the requirements of the project as well as the technical staff who were responsible for the delivery of the laboratory infrastructure. This required estimating resource required for every quarter developing a programme of work and identifying significant dates. This was then communicated to the technical staff through paper documentation and meetings in which designs were often refined. I chaired the meeting and produced relevant documentation.</p>	C1, D1
<p>At the start of the project new staff joined the department, which meant an alteration in laboratory usage and planned refurbishment of the space. During this change I had to communicate clearly and assertively the requirements of my test rig, to ensure minimal disruption to my project. This required communicating clear and realistic technical requirements and timelines for my project and expectations for future development. The laboratory refurbishment is currently taking place and I have ensured a down time of only 2 days in my experimental rig and keeping it in the laboratory where it is best placed.</p>	D1
<p>Since the inception of the project I have had to manage a researcher working full time on the project. The researcher is new to the department, and the UK. This has required agreeing hazard identification and risk management systems with him, training him in the requirements of health and safety under UK legislation and ensuring that he is working safely in the laboratory, where he is working with both toxic chemicals and class 4 lasers. The rumours and discussions about laboratory changes were potentially stressful for my researcher as it directly impacted his ability to work. Therefore, I put substantial effort in keeping him informed, engaging him in discussions and reducing uncertainty for him during this time.</p>	E2, D1

3. Programme Leader for Architectural Engineering Design MEng and MSc

When I began my lectureship I was tasked with starting a new MSc in Architectural Engineering Design (AED). I was also responsible for the final year of the undergraduate MEng in AED. In 2011 I took over as leader for the entire undergraduate and postgraduate programme in AED. I am passionate about this part of my job as I believe that encouraging and inspiring our students to follow a career in building services engineering, whilst providing them with strong technical skills and social awareness, is the best way of contributing to a sustainable future.

With overall leadership of the programme I am responsible for defining and reviewing the learning outcomes for the programme, and ensuring the module deliver embodies these values. The programme is run across three departments in two faculties: the Department of Civil and Structural Engineering, Department of Mechanical Engineering and the School of Architecture. Creating change across the entire programme, requires the ability to influence both peers and more senior colleagues.

The students study four main streams: structural engineering, thermofluids, architecture and core skills. In the first 2 ½ years this is very similar to the main streams in the respective departments and the leadership is mainly administration (e.g. checking timetabling and ensuring students are receiving relevant communications). In years 3 and 4 the modules become more specific to Architectural Engineering. It is during these years that I have had the most influence in the design of the taught content, being directly responsible for the design of 70 credits of taught material and overseeing the remainder.

The design project is an essential aspect of the programme, bringing together the taught engineering fundamentals from the early years. I designed the initial design project, and then implemented significant change in third year of running. In this process I **have recognised the limits of my own skills**, having little design experience, and brought various members of industry from consultants, contractors and manufacturers into the university to engage with the students. Alongside a colleague I successfully applied for funding from the Royal Academy of Engineering to fund a visiting lecturer (Jason Gardner – Buro Happold) to deliver the design module. Working closely with Jason in the design of this project has increased my awareness of **implementing design solutions** and **evaluating their effectiveness** on building projects. Through critically evaluating the students work and providing constructive feedback I intend to inspire them to **undertake engineering activities in a way that contributes to sustainable development**, a significant part of this involves encouraging them to think widely and critically about the potential benefits and impacts of their schemes. Basing their solutions on sound engineering judgements and social awareness.

In order to ensure the students are exposed to up-to-date information I **carry out continuous professional development**. It is essential I am at the cutting edge of technology for both my research and teaching, and also that I have close links to practice. In the past year this has included:

- Attending FutureBuild, Sept 2013 Bath, UK
- Attending the CIBSE Natural Ventilation Group Summer Seminar Passive Building Technology in Practice 21st June 2013
- Regularly reading both CIBSE journal and Architects Journal and ensuring I am up to date with relevant building standards.
- Working closely with leading practitioners (e.g. Arup, Buro Happold, Mott McDonald)

A1,
B3,E3

E4

<p>Through delivering the teaching and assessment of individual modules, pastoral care and having an overview of the entire programme it is essential to comply with relevant codes of conduct. In order to ensure appropriate levels of teaching quality I have undertaken a Post Graduate certificate in Learning and Teaching. The programme itself meets the faculty Learning and teaching strategy providing students with the attributes of the “Sheffield Graduate”. The undergraduate programme is accredited by the Joint Board of Moderators and the Institute of Mechanical Engineers. When taking over the programme I have reviewed various aspects of documentation to ensure I understand the relevant requirements of these bodies. I discuss any changes I intend to implement with a selection of relevant and experienced staff in order to gain appropriate advice (although I have responsibility for final decisions). Shortly after starting the MSc I reviewed the requirements for accreditation under the Joint Board of Moderators and along with our Director of Quality Control successfully obtaining approval as satisfying part 2 academic base requirements for a Chartered Engineer under UK-SPEC.</p>	E1,C4
<p>Alongside the technical requirements for our graduates a high quality programme also needs to ensure student satisfaction. Therefore, I instigated a student review of the two programmes in 2011. This took the form of a ½ day workshop with students, graduates and relevant members of academic staff. Alongside a general review of current staffing and future possibilities this led to significant change including:</p> <ul style="list-style-type: none"> • movement of modules between years • significant changes to the design module, moving it to third year and linking it with a larger civil engineering module • replacing modules that were 'underperforming' • instigation of mechanical engineering modules on the MSc • creation of AED tutorials to engage students with wider interests outside the curriculum 	C4
<p>Making these changes when the programme is run across three departments and two faculties is not easy. Further more there is regular change of administration and teaching responsibilities for staff. In order to lead the Architectural Engineering Design programme it has therefore been necessary to develop strong interpersonal skills, leading by influence and regularly developing new working relationships. This requires flexibility in approach, continually adapting communication and leadership styles to drive through change. For instance changing staff has meant differing communication methods (e.g. the preference for email / face to face meetings / phone calls differs between different staff members). It has been necessary to document these meetings in a clear way to ensure decisions are carried through year to year. It has required influencing senior members of staff in other departments to ensure the relevant support/modules are available. It requires being assertive to ensure there is no risk to core modules running, yet offering support / flexibility where appropriate to maximise the outcome.</p>	D1, C3,D3
<p>4. Chair of Athena Swan (Women in Engineering) committee</p>	
<p>I am chair of the Athena Swan committee in the Department of Civil and Structural Engineering. This requires an understanding of legislation and codes of practices covering diversity in the work place, particularly related to gender, taking this further to consider best practice. I gathered data on our current position and worked with the wider committee to develop an action plan (encompassing promotions, technical support, staff development) to improve our working environment for gender diversity. I currently chair the committee which is implementing these actions.</p>	E1, D1

