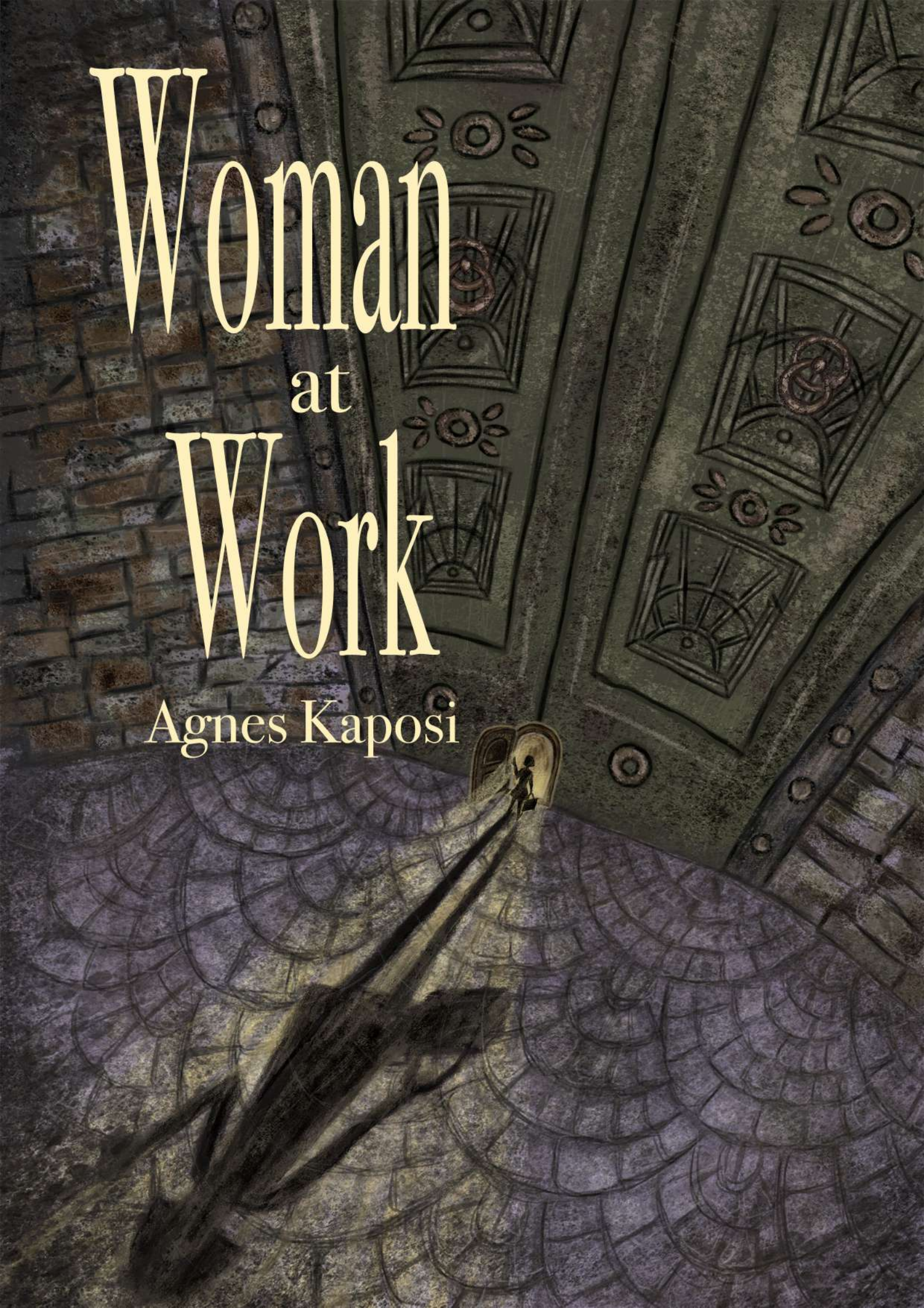
Woman at Work

Agnes Kaposi



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London, England

Prepared 2022-2024
Published in November 2024

Cover and back-cover design by Martina Csonka (Instagram csonkalines).

Introduction

What a life! From horrendous suffering to professional and national acclamation, here is a personal demonstration of the power of the human spirit.

Agnes Kaposi survived the Nazis in the Hungarian Holocaust, graduated in Electrical and Electronic Engineering at the Technical University of Budapest in Communist times, and, with her husband John, escaped in the Hungarian uprising of 1956, with only the clothes they were wearing and their personal integrity. They came penniless to Britain as professional engineers, not as refugees, and contributed to the British technological advances of the decade. Agnes gave a new meaning to the phrase "women's work" combining raising a family with advancing electronic engineering from traditional analogue methods to the digital techniques of computers. Although we had not yet met, we were both engaged in the transition to Information Technology. She saw the importance of teaching techniques for handling information and the underlying mathematics to the new generation of engineers; she established a strong department in the South Bank Polytechnic (subsequently South Bank University). In an environment that was predominantly male, her ideas and energy so impressed her professional colleagues in the Institute of Electrical Engineers (now the Institution of Engineering and Technology, IET) that she became well known and respected. Her approach to problem-solving (by understanding the nature of systems) applied not just to electronics and computers, but also to social structures in organisations.

Agnes was a significant force in the IEE Accreditation Committee, assessing the teaching in relevant university departments (Electronics and Computing), which is where I first met her, developing our common interest in software engineering and computer-based systems. She understood the needs and constraints of university teaching; her concerns, assessment and advice were clear and well-founded.

She was a skillful negotiator, able to find a way through difficulties (symbolised by the large door at the entrance to a college, in which there is a small door providing an undramatic entry). She achieved results not with drama and brute force, but by ingenuity and finesse.

Agnes Kaposi knows about prejudice at first hand, specifically antisemitism and intellectual snobbery (with occasional misogyny). Her childhood was dominated by the vicious Nazi destruction of Jewish society, which she fortuitously survived. (Her twelfth birthday was not celebrated: it was a period of hunger and deprivation without any relief.) In her working life she met challenges on two fronts: the disdain of scientists for engineers, and of universities for polytechnics. She responded to these unjustifiable positions by intellectual strength, determination and charm, vividly described here. Fortunately, there is now little misogyny in academic culture, but it is still rare for women to occupy senior positions.

Agnes has been recognised by her colleagues and the nation as a Churchill Fellow, Fellow of the Royal Academy of Engineering, and Member of the British Empire.

This woman at work is making the world a better place, and I am honoured to commend her story.

Ian Pyle
PhD (Cantab), Theoretical Physics
Founding Professor of Computer Science, University of York
Formerly FBCS, FIEE, C.Eng

Half a job or a job and a half?

Was it called Borough Polytechnic or South Bank Polytechnic? It was founded in 1892 as Borough Polytechnic Institute, with the aim "to promote the industrial skills, general knowledge, health, and well-being of young men and women". It is now the London South Bank University. The name of the institution kept changing, but whatever it was called at the time, in the middle of the 1977-78 academic year I was offered a job in it. I was in mid-career, 45 years old, a woman from an immigrant background, with a degree from a famous university, a PhD with eight years of research experience in the telephone and computer industries, and 13 years of service in engineering higher education, a Chartered Engineer, a Churchill Fellow.

I was a rarity, some even said a freak, an unnatural mother, working full time. Mine was a lonely existence: I neither fitted the company of my colleagues, nor of their wives. I was slim and young-looking, often the only woman on the scene, more than once mistaken for a tea lady or for my own secretary. Attempting to cultivate a dignified stance and pulling myself up to my full height of 5 ft 2, I tried to perfect strategies for repelling the unwanted attention of my colleagues and students, almost all of them male. I was hardworking and I loved my profession but would never have been able to progress in my career without the support of my generous husband and my youthful mother.

So here I was at South Bank, appointed in 1977 as Head of Department of Electrical and Electronic Engineering. Three things recommended me to the post: my industrial background, my PhD, and the successful Computer Aided Design Master's Degree course I pioneered at Kingston Polytechnic, my previous place of work. The Master's course had been popular, innovative in style and content, catering for an exceptional student population. The course demanded my attention until the end of that academic year. I accepted the South Bank post on the condition that in the initial period of my tenure as Head I would divide my time: mornings in my previous post, afternoons in the new, each task a full-time job.

Mr Pereira-Mendoza, the Director of South Bank, was a mild and charming Englishman of quiet voice and small stature. Legends circulated about him, whispered, never verified. He had a heavy limp and was said to be a war hero who lost a leg in World War II. He was honourable and generous to a fault. He refused the splendid buildings of the Imperial War Museum, offered as a new home for his Polytechnic, preferring the old premises on the Borough Road. His deputy was a retired Brigadier, tall, handsome, white-haired. I was the first woman engineer in their experience, much younger than themselves. They were kind and encouraging towards me but failed to come clean about the task they appointed me to tackle. Or perhaps they failed to understand it themselves. It certainly took me a while to grasp it, and almost a decade to get to grips with it properly.

I never met my predecessor, but even from a distance, he was larger than life, casting a long shadow. One heard that he had a complicated private life with family commitments in Wales and France and a job in South London, the whole wobbly structure held in place by his competent and besotted secretary. A control engineer of vision, he was among the first to perceive the dangers of, and pursue research into, global warming. I inherited from him a chaotic department with too many staff and too few students, and Gary Evans, a PhD student researching into hothouse gasses and climate change, subjects I knew nothing about. I also inherited the departmental secretary. She missed her idol, so she stayed only for a term, taking with her insight into the mysteries of departmental administration and of the formidable array of documents held in huge steel cupboards and cabinets lining the walls of my office.

At South Bank, Electrical Engineering had once been a flourishing department, beautifully equipped, with an army of students generously sponsored by the Electricity Board. The

department used to provide graduates and higher technicians for electrification throughout the Commonwealth. It also ran services for local industry: training and certificating electricians, calibrating measuring instruments, and testing audio equipment in the strange laboratory called 'anechoic chamber'. Staff were highly skilled and respected, some were authors of textbooks on Power Engineering, others were experts such as the illustrious High Voltage technologist Dr John Mason. However, demand for manpower in these subjects was shrinking, industrial sponsorship for students was no longer forthcoming. Year by year, fewer and fewer students enrolled. Most of the time, the bulky expensive equipment stood idle. When I arrived, student numbers were down to double digits. The staff were all male of course, and almost all older than I was. I learned later that several had applied for the post of Head which came to me instead. Nobody was pleased to meet me, and some were downright hostile.

There were early incidents. Arriving one lunchtime, I sat down in the canteen. A distinguished elderly man brought his tray to my table, asking if he could join me. I gave him a welcome smile which he did not return, but he introduced himself politely. "I am Peter Palmer, a member of your staff. I have an appointment to meet you this afternoon, and I want to make my position clear in advance, so you realise that there is nothing personal in what I say to you: simply, that I don't approve of working women. The woman's place is in the home." What could I say?

Soon after my arrival, I held a staff meeting, introducing myself, outlining my background and experience. Trying to paint a rosy picture of the future of our department, I said that the appearance of the transistor opened up seemingly boundless employment opportunities for electronic and communication engineers, computer engineers and computerisation. I told them about the Master's Degree course I devised and ran at my previous job. It was a course on computers for mid-range and senior managers in industry, commerce and public service. The popularity of the course was just one of the indicators of the growing importance of computing, I said. Including courses for computer makers and users in our departmental profile, we could build up our student population, form new links with industry and the community, and secure our future.

I do recall the name of a senior and serious man who emerged as the spokesman for the staff. What were my plans for the Power Engineering laboratories, he asked at that staff meeting. I said it would take time to procure new equipment for electronics and computing, but in due course we would have to make room for new computer laboratories, so some of the underused Power laboratories would have to be combined and some equipment may have to be sold or given away. "Vandalism", called out a disembodied voice. Then the departmental spokesman uttered the memorable phrase: "You are young and impressionable. You allow yourself to be seduced by the ephemera of fashion. Mark my words: computers are here today, gone tomorrow."

Firefighting

I found myself manager of a veritable empire: 50 academic and technical staff, a seven-floor building of lecture theatres, laboratories and staff workrooms, and four different courses of higher education. I was totally unprepared, as neither my education nor my industrial and teaching experience included any study or training in management. I had no chance to panic: I was fully engaged in day-by-day crises. Here are just a few.

The most promising member of my staff was about my age; in this department he counted as young. An experienced lecturer and holder of a doctorate, he was the only person teaching up-to-date electronics. I had high hopes for him and was keen to meet him, but he kept missing our interview dates. He suggested a morning meeting, but my mornings were spent in my previous job. I finally met him one morning after taking up full-time work at South Bank. Articulate and intelligent, he was well liked by his colleagues and students, exam results in his subject were more than satisfactory, but I soon discovered that he kept missing afternoon classes. He was an alcoholic, incapable after lunchtime. Everyone knew this except me. There was a conspiracy of

cover-up. He prepared tasks for his afternoon classes on which his loyal students worked by themselves, or under the guidance of other members of staff. It would have been my duty to remove him from his post. Luckily, within the year his Australian wife persuaded him to emigrate.

Another lecturer with a PhD was of similar age, of foreign origin like me, but unlike me, he spoke English without a trace of an accent. Control Engineering was his specialisation, a demanding final-year subject, students' degree classification depended on it. He taught the subject to our own students as well as to students in two other engineering departments. He was eccentric, liable to sudden outbursts of rage. His lectures were confused and confusing; as a teacher, he was hopeless. Students complained, then they boycotted his classes. Next, they occupied laboratories. Things really came to a head when, in protest, they occupied all the toilets in the building. Trying to contain the damage, I assigned him to less exacting teaching duties, whereupon the Trade Union took up his case, accusing me of race discrimination.

There was friction among the department's technicians. Several, including the Superintendent (the senior technician in charge of all technician staff and responsible for maintenance of all labs), were Indians from Kenya. One of them was high born and objected to working for a person from a lower caste. This was an easy one: I told him that it was his problem, not mine, he had to accept the authority of his senior or leave. I am glad to say, he saw sense and came into line.

There were a few knotty student problems. Here is one. The first-year tutor Alan Hall reported that one of his students failed his exams and threatened suicide. Alan was convinced that the student was in earnest. I interviewed the student. He came from the Middle East, his family name was known the world over, the very symbol of the region. Failure would have brought disgrace to the family. His father told him that he had only two options: to succeed or to kill himself. His marks could not be altered, but I managed to find a solution: transfer from our Higher Technician's course to a less demanding craft course in a nearby college of further education.

The job

After ending my commitment at Kingston and having dealt with the most urgent calamities at South Bank, it was time to take stock of my department.

There were huge problems with staffing, laboratory accommodation and funding. Just as pressing was the issue of the outdated courses, manifested by dwindling class sizes. But the biggest problem of all was the overall management of the Polytechnic as an institution. I was responsible for the operation and development of a department, but I had virtually no means of control. I could not hire or fire staff, nor reward success or sanction those who failed in their duties. I had no control over the size of the departmental budget, and almost none over the deployment of our meagre funds. The Polytechnic's Director and Deputy Director were benevolent but weak. Power was vested higher up, in an unfathomable multilayer bureaucratic network of the Inner London Education Authority, the Greater London Council (GLC) and the Department of Education. Arrangements were both obscure and rigid, decision making was slow and sometimes stalled altogether, and I could not afford to waste time.

Engineering education in universities and in Polytechnics

What gave me hope was that although my new department's courses were out of date, they had the potential to provide excellent services for students and the community, locally and nationwide. Universities ran full-time undergraduate courses in engineering. Polytechnics also catered for undergraduates, but in addition they ran courses for higher technicians. These were courses of shorter duration, and their entry requirements were less demanding than those of degree courses. That said, the qualifications they provided were highly valued by industry, offering good employment prospects.

At South Bank, both undergraduate and higher technician courses were available in full-time and part-time mode. Part-time students were mature and committed. Most were employed in industry, seeking to better themselves by studying and gaining formal qualifications whilst earning a living. Of course students benefitted from the education, but the benefit was mutual: they brought to the teaching staff their insight into industrial practice and experience. They were a pleasure to know and a privilege to teach.

The courses of my new department were linked, forming a comprehensive system of engineering higher education which facilitated students reaching their full potential.

- Students on the full-time degree who failed in one subject of their first year could continue with their studies on the full-time Higher National Diploma (HND) or on the part-time Higher National Certificate (HNC) course, and qualify. The link also worked in reverse: high-performing HND students were eligible for promotion to the degree course.
- Transfer between full- and part-time courses was also possible. Rather than dropping out from education under financial pressure, full-time students could look for employment and continue their education, uninterrupted, on the equivalent part-time course.

The system suited our intake admirably. Many of our students came from overseas or from other parts of the country, but the Polytechnic also catered to the local communities of Vauxhall, Brixton and other areas of South London. Some schools of these districts were poorly funded and inadequately staffed, so some of their able students emerged without the requisite qualifications for entry into a degree course. The HND served as a stepping stone to the degree and even beyond; for example, one of my PhD students came through this route, and another of my research students, John Mizon, became Chief Engineer of a major international company [1]. There were also examples the other way, such as a student entering the degree course with good A-levels from prestigious Manchester Grammar, but since his academic abilities were modest, he would have failed at a university. However, he had good practical sense and emerged from our HND course as a qualified higher technician. The system also aided departmental efficiency. Since the full-time and part-time degree courses led to the same examinations, some classes could be taught jointly to both cohorts.

The system remained the backbone of my work during my ten-year tenure as Head of Department. It was flexible, allowing for radical course revision, addition of new courses, and extension beyond degree to postgraduate study and research. It also proved responsive to the needs of industry and the wider community.

I will show how this sound and efficient system of engineering higher education was threatened by bureaucrats, traditionalists and worse, how I fought for it, and what the fight cost me both personally and professionally.

Managing staff

Good education can be provided even in poor teaching facilities, even with poor equipment, but not without competent, dedicated staff. What can a Head of Department do with absentee staff? Outdated staff? Inadequate staff? There was no easy answer. Heads had no power. Staff could not be dismissed. A hopeless teacher, a habitual drinker or a downright irresponsible member of staff stayed on the payroll.

Taking their lead from my absentee predecessor, my staff adopted a minimalist approach to their teaching duties. Instead of working at their jobs and keeping up-to-date, they developed outside interests. One ran a lucrative yoghurt farm, another had a flourishing small business. One was in great demand as a wine expert, earning good money as an after-dinner speaker, yet another was a driving instructor, and some cultivated prize vegetables on their allotments. They considered it their right to teach short hours and take long holidays. They pitied me because I worked 14-hour days throughout the year.

In frustration, a fellow Head swore at her staff, and after a battle in the courts, publicised nationwide, was suspended for years on full pay. Other Heads attempted gentle persuasion, hoped to lead by example, or tried shaming staff into a change of attitude. I tried all these and more. Matters improved in time, but at first my staff considered me a joke: "Dr Kaposi compensates for coming to work early by going home late."

Measuring efficiency

Measures are the essential tools of an engineer. We use them to specify tasks, guide designs and evaluate results. But measures can be misused and abused. My book 'Yellow Star – Red Star'[2] offers examples of a misguided and dogmatic Communist regime using measures which paralised workers and hindered rather than aided development. Student/Staff Ratio (SSR) can be a useful guide to departmental efficiency, but in my day, it was badly defined, impeding progress in higher education.

Calculating the SSR of a department is easy: divide the number of students by the number of academic staff. The bigger the ratio, the better, or at least the more efficient the department. Stands to reason.

Except it does not. Here is an example of a system driven by SSR obstructing rather than motivating progress.

How do you count students to calculate departmental SSR? Simple: count the students enrolled. Wrong. The formula is not based on the number of students enrolled but on the number of contact hours: the hours students spend under the direct supervision of staff. If the part-time student spends a third as much time on the premises as the full-timer then he counts as ⅓ of a student, although head-for-head, part-time education is more labour-intensive for staff than full-time. Part-time education demands preparation of a comprehensive range of tasks on which the student works on their own. Completed work must be marked. More tutorial time must be provided than for full-timers. Teaching staff must often liaise with employers. The bureaucrats who invented the SSR may never have met a part-time student, but penalised departments that offered part-time education.

Punishing growth and innovation

Consider the scenario of growth. Students arrive in September, up goes the SSR, but SSR statistics are only submitted at the end of the academic year, so you work short-staffed all year. Moreover, the authorities drag their feet with approving a new staff quota because of inefficiency or to save on staff salary while raking in the revenue from student fees. It takes a couple of terms for a new staff quota to be approved, another before interviews are held, and yet another for the appointee to serve out their notice. Growth is punished by running at a two-year staff deficit.

Far worse is if a department introduces a new course. The new course is devised through consultation among staff and industrial advisors. It is comprehensively documented and presented for approval to the internal and external authorities. Modifications suggested or imposed must be implemented and approval newly sought. This time-consuming and stressful work takes a couple of years at least. If the new course is successful, students enroll, and here starts the two-year delay of growth. Innovation is punished by a four-year staff deficit.

In our fast-developing branch of engineering, courses were in great demand nationwide, even worldwide. Mounting new courses meant working under chronic understaffing. One became a joke not only among one's own staff but also among fellow Heads of Department.

The small door

I was up against it in all aspects of departmental management. It was a bureaucratic prison in which we were trapped behind heavy gates. If I were to get anywhere, I had to find in those gates some small side door.

Equipment: Capital items versus consumables

Funding came under two headings: 'capital '(big items) and 'consumables' (small items with a price limit of a few tens of pounds, such as electrical components, cables, etc.). An impenetrable brick wall divided the two types of budget; shortage in one budget could not be covered from surplus in the other. How would we make this work?

A "small door" was the answer: a conspiracy between my smart Superintendent and our helpful suppliers. A capital item costing hundreds would be invoiced as a dozen items of low-cost consumables. The price of the bits had to equal the actual cost of the item, although sometimes the items on the invoice did not fit the parts list of the equipment bought. This was against the rules, gave extra work for my poor Superintendent and caused me plenty of anxiety.

Equipment: Up-to-date or obsolete?

If you buy a computer, a smart phone or TV nowadays, within weeks your purchase is out of date and a better, cheaper model appears on the market. The same was the case when, rarely, we had the funds to buy a substantial item of capital equipment costing thousands. The functionaries of the GLC knew nothing about electronics and computing. They devised a system whereby you had to apply for capital equipment once a year, in late March. The request had to be justified with respect to the syllabus, and the equipment specified by type, cost and manufacturer. In the happy case of approval, the funds turned up nine months later. By then the equipment would be out of date and a better, cheaper alternative would be available for other purchasers, but not for us.

The "small door": my trusted Superintendent persuaded the helpful manufacturer to provide the cheaper newer equipment while invoicing the older model. The certificate of guarantee covered the actual equipment delivered, rather than the one invoiced. The difference in price – the money saved – was spent on some small device or on a bag of consumables, quietly agreed between Superintendent and manufacturer.

This arrangement brought considerable benefits to the department. I am sure that it was against institutional rules and the anxiety hung over me. The authorities might at any time have subjected us to an equipment audit which would have brought to light our devious machinations. Fortunately, they were too inefficient to mount such an audit in all the years of my tenure.

Small door in a staff crisis

Several of the older members of my staff applied for, and were granted, early retirement. Frankly, I was pleased to see them go: SSR improved, and their specialist subject was to be phased out soon anyway as we updated our courses. Meanwhile we had a crisis: students needed to be taught, classes had to be covered. My first groundbreaking idea: use the petty cash budget to hire inexpensive but high-quality part-time staff! To be insured, the new teachers needed some status, so we enrolled them on the HNC course. They did not attend HNC classes but performed teaching duties on whichever course required them.

In came postgraduate students from Imperial College, an institution where I had accommodating professional friends. The arrangement worked a treat. The postgrads enjoyed the job and the pocket money, and students were thrilled. Using the same ruse of enrolment into

the HNC, I later "employed" two eminent retired engineers, Dr Arnold Lynch from the Post Office Research Station and Dr Frank Evans, erstwhile Reader at Queen Mary University London. After retirement, the two of them wanted to carry on with their research in a laboratory. They inspired my young staff, initiated and supervised student projects and gave celebrity lectures, enhancing the quality of life of the whole department. They did not even accept pocket money for the invaluable services they provided.

Sneaking in computers through the small door

I was mindful of my mission: to turn this somnolent 19th-century department into one where students would study to design computer circuits, build computers and use them in solving problems. But this was the late 1970s, and computers were still a relative novelty. There was not a single computer in my department, and there was only one monstrous data-cruncher in some corner of the Polytechnic. How could one make a start? The departmental budget would never stretch to computers, however simple and cheap they might be, and neither would the bureaucrats of the GLC allow such extravagance.

The solution came through a small door, unexpectedly. The Chief Engineer of a local company asked me if my department could offer a computer training programme for his storekeeper and for his administrative staff. The focus: routine calculations and keeping records.

This gave me the idea to ask the local Chamber of Commerce if computing skills might be required by their businesses. They said such queries came to them daily. We agreed cost and details, and they recruited 20 participants. Fees were paid in advance, enough to buy 20 small, free-standing computers. A member of my staff took charge of the project. Computer Science postgraduates from Imperial College ran the classes. The course was repeated several times, and of course our department retained the little computers. A modest start, but the ice was broken, computers had arrived in our laboratories and computing could be introduced into our courses.

Course approval Polytechnic-style

British universities are autonomous. They appoint their own professors, they approve their own courses, they award their own degrees.

Not so Polytechnics, the poor man's universities [3]. Polytechnics were new institutions, they lacked tradition and patina, they could not be trusted to run their own affairs. They needed oversight.

In Polytechnics, academic standards and operational procedures were under dualcontrol. Their Academic Board functioned like the Senate of a university, but an additional layer of control was exercised by the Council for National Academic Awards (CNAA)[4]. Degrees were not awarded by the Polytechnics themselves but by the CNAA whose task it was to ensure that the standard of higher education in Polytechnics was consistent with, and at least as high as, that in universities. The system was created in 1965 and worked excellently until CNAA's dissolution by John Major's government in 1993.

Operating from a formidable building on the Gray's Inn Road in London, the CNAA had a comprehensive network of specialist boards and committees, consisting of distinguished professors and senior members of the professions. All fields of study were covered, from engineering to geology, from theology to law. I had plenty of experience with the system from both sides: I submitted undergraduate and postgraduate courses and a dozen of my PhD candidates to CNAA's scrutiny, and in the latter years of my Headship at South Bank, I served on and chaired numerous CNAA boards and committees, examined courses and PhD candidates of others. I even served on the CNAA Board that tested the suitability of entire academic institutions to award degrees.

Course Accreditation

I was still a relatively new Head of Department when the Engineering Council introduced a programme of course accreditation across all its professional institutions. Accordingly, our own Institution of Electrical Engineers (IEE) [5] sent out a letter from its headquarters (next door to the Savoy Hotel in London) to all universities and Polytechnics, inviting them to submit their Electrical/Electronic Engineering undergraduate courses for accreditation. The letter reiterated the role and status of the Chartered Engineer, explaining that in future, membership of the Institution would be restricted to holders of the award of an accredited engineering degree. The importance of accreditation would be publicised throughout industry, the letter said, and warned that courses failing to gain accreditation were expected to wither away and soon close.

Submitting a course for accreditation was a major exercise. All relevant features of the course and the institution had to be documented: course structure, curriculum and timetable, departmental staff and resources, research and publication list of staff, employment record of graduates, testimonials from employers, institutional provisions such as library and student support services, etc.

For once, my staff and I were at one: we owed it to our students, our department and ourselves to surmount this new obstacle of course accreditation. Almost everyone was willing and ready. One of my taciturn Principal Lecturers volunteered to coordinate the preparation of the documentation, another offered to host the visit itself. I started to enjoy heading up such cooperative staff!

In accord with the IEE's requirements, we promptly sent two 'letters of intent': one announcing submission for accreditation of our full-time degree, and another for the part-time degree.

The IEE's response was equally prompt. They were 'surprised 'to receive our intention regarding the part-time degree. Accreditation could only be gained by courses of high standard. Accordingly, the IEE's policy was only to consider full-time degrees for accreditation.

What did I feel? Disbelief. Frustration. Rage. A bitter sense of injustice. Those who made these 'rules 'may never have met the likes of our part-time students. How dare these people from the in their plush offices and committee rooms next to the Savoy refuse even to consider the efforts and achievements of our students - honest, mature, hardworking people who dedicated years of their lives to gain engineering qualifications?

It took me days to calm down enough to work out how to reply. I called a meeting and put before the staff my suggested response: we appreciated the importance of accreditation and were keen to submit our courses to the IEE's scrutiny, but only if both our full-time and our part-time courses would be considered. Otherwise, we would submit neither course. Unanimously, my staff agreed.

We attached to my letter a brief outline of both full-time and part-time courses, stating that the two cohorts met the same requirements, took the same examinations, on the same days, in every year of their course. We mined out student records from those forbidding steel cupboards in my office. Going back several years, we documented our students 'final-year examination results and degree classifications. It was John Hobbs, the oldest member of staff, who invented the 'temperature chart': full-timers listed in a column on the left of the page, in order of merit, part-timers on the right, from failure grade at the bottom to 100% result on the top. Year by year, temperature charts showed that on average, part-timers' results were 15% higher than those of students graduating on the full-time degree.

I wrote the letter, and before sending it, I warned the staff that this was open defiance and a gamble. The IEE might rule out both our full-time and part-time courses from the accreditation process, and that would mean the death of our courses and of the department. There was no dissent. All the staff agreed that this is what I should write, on behalf of us all.

It was our good fortune that the IEE asked Professor Ewart Farvis of Edinburgh University to examine our case. Professor Farvis was eminent and vastly experienced. As a boy, he started work as an apprentice. He proudly claimed that he went through all levels of engineering training from craft through technician to degree and PhD, continuing thereafter to receive honorary degrees and awards for his academic and professional achievements. He paid our department a preliminary visit and agreed to us submitting both our full-time and part-time courses for accreditation.

Accreditation was an unqualified success. The letter of approval said that the Polytechnic should support the new Head (me) to implement the planned reform and modernisation of the syllabus. There were also pleasing comments about the dedication of the staff and the maturity of part-time students. And there were nice consequences.

- I was invited to join the IEE's Accreditation Committee, a great honour. I served on that committee for nine years instead of the usual two or three. I was the only woman, and for years the only Polytechnic Head on this august committee of senior professors, researchers and learned industrial members. There were a few touchy moments when old-established universities were found lacking, and my authority as Chair of the Accreditation Panel was challenged. I stood firm and was staunchly supported by Clive Holtham, the IEE's skilled and tactful senior officer. Soon after, I was elected Fellow of the IEE (the seventh woman in its history since 1871) and also to the Council of the Institution.
- Professor Ewart Farvis remained my friend and mentor until the end of his life. He and Edinburgh University will remain dear to me for the rest of mine.

Accreditation was a turning point in the life of my department. For years, ours was the only accredited part-time engineering degree in the country. Students flocked in from far afield. Accreditation offered widespread positive publicity. Student numbers rose on the part-time and also on the full-time courses, even before our forthcoming radical course review. The dreaded SSR began to creep up to a respectable level, and we were allowed to recruit the first new member of staff: Dr Duncan Gillies, who is now Emeritus Professor Gillies of Imperial College.

Staff development through the small door

This new recruit was the first and only computer scientist in the department, a youngster with a brand-new PhD and without any teaching experience. Dr Gillies was brilliant, knowledgeable – and isolated. His colleagues, all of whom were engineers, viewed him with suspicion. How was I to integrate young Duncan into the staff, and how to induce other staff members, twice his age or more, to learn from him?

Dr A was an intelligent man, perhaps the least hostile towards me and my ideas. I called him in for a chat. I said Duncan was a promising young man. Dr A agreed. However, I said, he was inexperienced and needed a mentor. Dr A agreed. I asked: Would he be willing to sit in on Duncan's classes and offer him advice? Dr A said the classroom was the lecturer's own domain and Duncan might resent his presence. I said I would clear the matter with Duncan.

Dr A and Duncan became good friends, the former offering wise advice on teaching and the ways of the institution, while learning from the latter some of the subject matter. Neither of them was a fool, and they recognized that it was a credit to them both that they made my method of staff development work. Dr A soon picked up enough knowledge to assist Duncan and went on to teach computing to junior classes.

Mathematics for the digital age

Mine was no longer a lone voice. The IEE's Accreditation Report practically demanded modernisation of our syllabus. A chance to introduce computing to the engineering curriculum.

One option was simply to teach computer programming in the earlier years of the course and add computer-related specialist subjects in the final year. Now that I served on the Accreditation Committee, I had sight of curricula of courses offered the country over. I saw that this is what most of my fellow Heads had done at universities and Polytechnics.

Somehow this did not seem satisfactory.

Mathematics has always been the bedrock of the formation of engineers. My generation of engineers, like our seniors, were taught to deal with signals and forces that varied continuously. The calculus – the mathematics of infinitesimal change – offered engineers methods of designing *analogue* equipment which dealt safely and securely with such continuous change. But this new computer-based equipment operated on *digital* signals which changed in steps rather than continuously! These strange discontinuous digital signals could not be seen on our oscilloscopes, and were even beyond the scope of the beautiful calculus of Newton and Leibnitz! Our analogue world has collapsed, and our syllabuses made no sense anymore: we were teaching mathematical foundations for the analogue technology of yesterday, while offering no mathematical support for designing digital technology for today and tomorrow. Theoretically speaking, we were bankrupt: the digital technology we taught appeared to be hanging in the air, unrelated to the mathematics taught in the course; as far as I knew, unsupported by mathematics of any kind.

The question was: did any relevant mathematics exist at all? I knew nothing like it, and clearly, neither did my fellow Heads of university and Polytechnic departments.

My first port of call was my Dean, Dr John Dubbey, who happened to be a mathematician. He was mildly encouraging, but that is as far as he went.

Next, I turned to my friend Dr Yaël Dowker, a Reader in Mathematics at Imperial College. She understood my question, she reassured me that there existed a mathematics which might suit the new digital age, but the relevant branch of mathematics was not her subject. However, she introduced me to Dr Oliver Pretzel, another Reader of her department.

It was a revelation. Dr Pretzel said my instinct was right, there existed a whole mathematical domain to support digital computing. It was called Discrete Mathematics. He demonstrated this with several examples which I could relate to my teaching and research. He said he had tried and failed to interest his engineer colleagues in this matter, and was thrilled that at last an engineer was reaching out to him, thought along lines similar to his own. He felt vindicated and was more than ready to help.

Here was a chance for radical curriculum reform. Tucked away in our underfunded department in a Polytechnic, we became pioneers, devising a new mathematics syllabus for the engineers of the digital era. We could have blown our trumpet to publicize our work widely, but we were too busy developing our untried, untested material, introducing it to our students. Dr Pretzel helped, so did Dr Dubbey, and so did our students who appeared to take to the new mathematics immediately. With the aid of these mathematical heavyweights, I convinced at least some of my staff and all the academic establishment of the Polytechnic that I was not mad and had not fallen victim to the 'ephemera of fashion 'of the digital age of computing.

Customarily, departments serviced each other's courses, supplying teachers in their specialisation. I turned to the Head of Mathematics for support in teaching Discrete Mathematics. He could not help: the only mathematician in the Polytechnic knowledgeable about the subject was Dr Dubbey who was now the Dean. I asked my mathematician colleague what we should do. He shrugged his shoulders: do it yourselves, he said.

In the early days, postgraduates from Imperial College and Dr Dubbey himself taught our classes. As Dean, he supported me in setting up a Discrete Mathematics section within my own department. SSR permitting, in came a splendid array of keen, grateful mathematicians, among them the now illustrious Professor Norman Fenton of Queen Mary University, Dr John Dwyer who later headed up the Mathematics and Computing Department of an American university [6], Dr Gabor Nyerges, Dr John Selig and others, among them the excellent Dr Mary Attenborough, author of a textbook on the mathematical foundation of both classical (analogue) and

contemporary (digital) engineering [7]. Their expertise complemented my own research experience, so to my surprise, I found myself able to help, and I enjoyed teaching some of the classes. Our collaboration became a hotbed from which a postgraduate research school grew. Research funding was provided by industry, including BT, and by projects of the European Commission.

Course structure

Since the Accreditation report indicated that our courses had to be revised and new specialist subjects had to come in, reluctantly, almost all my staff agreed to participate in course development work.

To make time for the new subjects and provide them with teaching resources, some traditional subjects had to be withdrawn. This was painful for those who had devoted their professional lifetime to these subjects, but nobody could argue with SSR and with the IEE's accreditation demands. To forestall arguments, I formalised objective criteria:

1. Specialist subjects unsupported by student demand and offering students little prospect of employment had to be withdrawn.
2. All final-year subjects had to be underpinned by research, industrial sponsorship or high-level scholarly activity.

The logic worked over the whole of the syllabus. To justify the inclusion of a topic in theoretical subjects such as Mathematics, Physics, Computing or Engineering Theory, it had to be justified by the need for it in some other subject of the course. The course structure emerged as a matrix, with specialist subjects as 'customers' for foundational subjects.

It was cruel logic. Some beautiful subjects which had been essential to the formation of engineers of my generation had to be sacrificed in the name of progress. Out went Projective Geometry, Electrostatics, Vacuum Technology and others. But in had to come Discrete Mathematics, Software Design, Signal Processing and various applications of Digital Technology, to mention but a few. In their wake came more students and support from industry.

New course for the graduate unemployed

Research publications and reading papers at international conferences made me better known, as did being one of the IEE's accreditors. Our department's work also aroused interest. The Manpower Services Commission [8], a public body, asked me if my department could assist in alleviating high levels of graduate unemployment.

My childhood was spent in the shadow of graduate unemployment, so I have a soft spot for the unemployed. I wish I remembered the name of the sympathetic, unbureaucratic senior official of the Manpower Services Commission who came for a short exploratory visit from his office in Sheffield. Instead, he stayed for half a day, leaving with a plan to convert 'numerate graduates', unemployed for at least two years, into Master's of Information Systems Engineering. The Commission provided staffing cost, resources and student grants. How did I feel? I was walking on air.

Entry requirements included a 1st or 2nd-class degree in Mathematics, Physics or Chemistry; also, in all branches of Engineering, Economics and Business Studies. Other subjects with substantial mathematics, statistics and/or computing content were also considered. It was a two-year course with a sizeable project element, fast-moving, demanding, relying on students ' motivation and proven academic ability.

The MSc was an immediate success, as testified by the good jobs gained by graduates. After two years of its running, student demand exceeded the generous quota of the Manpower Services Commission. We harnessed additional industrial support. Our Postgraduate School grew to

number over 200 students. We were amazed, as were Heads of university and Polytechnic departments.

More new courses: HNC, HNC for women graduates

There was no holding back the Manpower Services Commission. They returned, asking for ideas for new courses. They were professional and fair, a pleasure to work with, and they had money in hand. We responded by offering a Higher National Certificate course, originally for unemployed women graduates only, with a special dispensation from the European Commission. Later, the course was extended to include any well-qualified unemployed graduate from any discipline. The entrance examination included a 'maths-and-lab' aptitude test. Those who failed the test were offered a summertime preparatory course, the successful securing admission to the HNC. Our HNC course put competent women technicians into the labour market, surprising employers and even the women themselves.

Finding staff

The student population was growing, and so was the staff quota. Half-way through my tenure as Head, the Department of Industry (under whatever name) came forth with the initiative to extend computer education nationwide. I believe we were the recipients of the largest benefit in the whole country: additional status for 11 new members of academic staff.

This bounty carried its own problems. Suddenly everyone was looking for high-quality, computer-savvy electronic engineers. The salaries we offered were way below those in industry, and universities had more prestigious names with better facilities and lower teaching loads than ours. How could we compete?

Quality of staff was the determining factor for the quality of education we could provide, and I was determined to maintain standards. I tried that small door, looking for the unusual. Here are a few examples.

- Dr Chris Hammond, one of my lecturers, told me of a school friend of his wanting to return home from New Zealand, a zoology professor whose department down under had been disbanded. Chris said this zoologist was versatile and brilliant; perhaps we could use him temporarily as support staff. It turned out that Dr John Pilkington's research had concerned the landing mechanism of the fly, and in his work he had studied radar technology, instrumentation and control. His knowledge and laboratory experience of some of the key theories and methods of electronics and communication were deep and up to date. He proved to be an outstanding teacher and a loyal member of staff. Advancing through the ranks, he soon became one of our Principal Lecturers.
- Professor Rowland Stout is now Head of School of Philosophy in University College Dublin. At that time, he was a new graduate whose First-class BPhil degree in Oxford included Mathematical Logic and Discrete Mathematics. Young, brilliant and funny, he was a hit with students and staff alike.
- Physics had been a popular subject after the War, but by the late 1970s, physics departments were closing or shedding their staff. Dr Robert Kaye was a physicist specialising in Semiconductors. An excellent teacher and organiser, he walked straight into a senior post in the department.
- Dr T was an eminent Turkish electronic engineer who had emigrated to a western European country where his family had not been welcome. He wanted to come to the UK because he heard that the Head at South Bank was an immigrant and thought there he would find fairness. I applied for a labour permit on his behalf, proving that we had advertised a post in his field and could find no suitable applicant. He soon established himself as a highly valued member of staff.

- Women Electronic / Communication / Computer engineers were, and still are, a rarity. Our new recruits included quite a few, among them Dr Monira Abu El-Ata, Dr Raka Mukherjee, Gillian Hill and Dr Fleur Taher-Tehrani, all young, competent, gentle-spoken and tough. They feature in a 1984 national survey of women in electrical engineering education [9]. I too appear in that survey, the only woman Head of Department. The journalist who conducted and published the survey said it was not chance that our department had by far the largest number of women academics. My women staff told her that they applied for a job at South Bank because they liked our work programme and also because they hoped for a fair chance from a woman Head.
- Most engineering departments, including my own, had postgraduate students and junior engineers as part-time staff in supporting roles. We extended these arrangements to experts. Professional friends in industry and industrial sponsors of Master's students joined as part-time staff, supervising student projects and offering specialist lectures. Our part-time staff built up gradually, and near the end of my tenure topped 100. Among them were researchers, departmental leaders, chief engineers and even some managing directors. Their teaching duties were regular, but their teaching hours were small, typically one session per week. They were employed as staff, their hourly rate fixed by bureaucracy. Most donated their fees to the department, boosting a fund managed by our Superintendent to buy consumables for project work.

Up against it

Just when the department's fortunes appeared to be on the rise, Jeff Knight, one of my old-timers, came with a problem.

Our undergraduate course was a 'sandwich' degree, a valued method for educating engineers. This was a four-year course, students spending the third year in industrial practice, working on projects under joint academic and industrial supervision. For many years, Jeff had organised industrial placement for sandwich students, and did this ably and enthusiastically. It was a rewarding task: industry had a shortage of skilled labour, the sandwich year followed two years of full-time undergraduate education, students were trainees but were highly employable, they were welcomed by employers. However, recently some students accepted on paper, were told on arrival that the placement was no longer available. Jeff tried confirming the arrangement just before the student appeared on employer's premises, but minutes later the job was no longer there. On close examination of the cases, Jeff found that the refused students were black or of Asian origin. Clearly, these employers were in breach of the Race Relations Act of 1965, but we were in no position to prove this, or take them to task. Such was the situation that the very viability of the sandwich degree was threatened.

Just then, I was to attend a meeting at the Queen Elizabeth Hall, organised by the Leader of the GLC [10]. The topic was GLC's enhancement of community liaison in education. Senior staff were invited: head teachers, college and Polytechnic senior staff down to the level of Heads of Department. The Leader of the GLC and other luminaries made speeches, and then contributions were invited from the floor. I raised the problem of finding placements for sandwich degree students from ethnic minorities. The GLC Leader turned on me, saying that I got it completely the wrong way around, our task was to make minorities feel welcome, learn about their culture, rather than forcing them into the existing cultural mould of the indigenous population. He brought up examples for us to follow: schools where Indian dancing and the playing of African drums were taught. It was lost on me how this related to ensuring equal access to industrial placements for sandwich degree students of engineering.

We had to find a small door. We cleared a large laboratory of power engineering machinery and set about establishing our own in-house factory. What did I and my staff know about organising and managing a factory? My husband was managing director of a manufacturing

company at the time; he helped us with the planning. My childhood friend Gabor Lacko, production director of an electronics company, helped with obtaining and arranging the equipment. With their help and with support from industry, we set up our 'factory', entirely run by our sandwich students. There was a logo, a Managing Director and a Board; there were departments of design, manufacture, marketing, administration and quality assurance. Students learned engineering and management on the job. The Board included industrial experts as advisors and non-executive directors. A single product line was running every year, but the following year's product was already under design. In the first year of operation, the product was an anglepoise-style lamp. I bought one of course, and it may still be in my garage. The following year the product was a battery-operated mechanical toy.

Jeff Knight continued to do his best to place sandwich students in industry. Meanwhile our in-house factory made the sandwich course safe and secure.

Going under?

During my ten years at South Bank, the student population increased almost twenty-fold. Once the Manpower Services-inspired MSc and HNC courses were in place, the department had more than 1000 students, 50 full-time and over 100 part-time staff, 50 technicians and four secretaries. Ours may well have been the largest engineering department in the country. We were certainly the largest provider of part-time engineering education, and we possibly ran the largest graduate school.

As the department grew, so did the volume and diversity of my responsibilities. I ran the departmental show, I taught at least one class (usually first-year students so that we should know each other), I supervised PhD students (on average 4 at any one time), and trained PhD supervisors. I served on and chaired a variety of committees of CNAA, IEE, Engineering Council, the Royal Academy of Engineering, the Science and Engineering Research Council, BTech and, as British representative, the Hungarian National Accreditation Board. I was external examiner of undergraduate and MSc courses in this country and abroad. To assure that I was up to date and in touch with industry, I worked as a consultant to some small and large organisations, including BT's own consultancy division at their Martlesham research laboratories, and I acted as advisor to universities in the UK and overseas. Fourteen-hour working days and seven-day working weeks were no longer enough. For a while my patient, gentle husband John did not interfere, but when I became too exhausted to sleep at night and started on sleeping pills, he put his foot down and convinced me that something might give unless something was done.

Saved by departmental organisation

My John was an engineer, Managing Director of a manufacturing company, a calm and competent manager of a much larger outfit than mine. He had supported me in all my academic and professional endeavours throughout our married life. Could he advise me how to go about my job as a manager?

We took ourselves to the Cotswolds for a long weekend, and together we devised a departmental organisation such that in future four people would report to me directly instead of a couple of hundred, as before.

It was a simple matrix structure with Courses in horizontal rows and Subjects in vertical columns

- The department had seven courses: the four already in place when I joined (full-time and part-time degree, HND, HNC), together with the new MSc, 'HNC for women 'and 'HNC for graduates'. In the new structure each course had its own Course Leader, reporting to the Director of Courses. Course Leaders were responsible for all student affairs:

recruitment, timetabling, student welfare, personal tutoring, running the sandwich year in-house or in industry, and assisting students in finding employment on graduation.

- The curriculum was divided into eight 'subjects': Engineering Mathematics, Engineering Theory, and six specialist subjects, each with its Subject Group, laboratories, workshops, research programmes and budgets, each with its Subject Leader, the department's recognised expert of the subject. Everyone belonged to a Subject Group, including academic staff, part-timers and me. The Subject Leader was responsible for the quality of every aspect of work relating to the subject: teaching, syllabus design, examination and project work, staff development and industrial liaison and application for funding. Subject Leaders reported to the Director of Studies.

The four people reporting to me directly were: (1) the Course Director, (2) the Director of Studies, (3) my Superintendent and (4) the Director of Research, responsible for funding, research projects and MPhil/PhD students.

Once I found the right person for each job, delegation worked well, the new structure fell into place almost naturally. Staff seemed to like it. There had been no chaos before, but now there was pleasing order to all matters. Assignment of duties and responsibilities took place almost without problem:

- Old-timers understood course management and cared for student welfare. They regarded their task as Course Leader as recognition of their seniority and authority.
- Specialist staff were interested in research and developing their skills, happy to leave course administration to others. New initiatives sprung up in subject groups, such as seminars given by our own subject specialists or by invited experts. At first shyly, later with increasing confidence, my young specialist staff invited me to these seminars and were pleased and proud when I brought along professorial guests and industrial experts.

Courses were running well. Now the majority of staff was ambitious, supporting and instigating rather than fighting progress. A test of maturity of an organisation is that there is no individual on whom it critically depends. I began to feel confident that the department could run itself without me. Soon it would be time to go.

A deputy

I was still overworked of course, but this new matrix structure helped me to enjoy most of my job. Most, but not all. There were timewasting meetings which I had to attend, ex-officio. There were ceremonial occasions where I had to be present as head of department, and sometimes even officiate, but ceremony had limited interest for me personally or professionally. And then there was the matter of the bar-side.

As in many organisations, in our institution much important business was transacted at the staff bar. One heard useful gossip, there was horse-trading among heads of departments, minor disputes were settled by banter, backslapping and telling a joke. People had a chance to ingratiate themselves to decisionmakers and holders of purse strings by buying them a drink. I was no drinker, I had no bar-side manners, and being a woman, my presence might have stifled the enjoyment of others. I kept away from the staff bar, but I was aware that my absence put my department at a disadvantage.

It was not my husband's idea but my own that I should acquire a deputy to take care of some important but tedious matters on my behalf. I even worked out who was the person for the job.

Alan M was not young but agile and youthful. He was no academic but a useful member of staff nevertheless. He was a good teacher, popular with the students. He had style and confidence, even charisma, had admirable bar-side manners, and held his drink well. And most importantly, he was streetwise. Of course he was, he and his mother had a stall on nearby Borough Market. He

could have taught me a great deal about finding that small door alongside crippling rules and regulations.

My department was large and growing, and the institution's bosses were used to my initiatives which were strange but worked somehow. They had no objection to pin on Alan the title of Deputy Head, as long as it cost them nothing. Alan was thrilled with the title, the staff accepted him happily, a win-win situation. Here are a couple of examples of the many invaluable ways in which he helped me and served the department.

Gaining space

Student numbers on our existing courses kept swelling, and we had several new courses. Where to put the extra students? Lecture theatres were allocated centrally, so our students had somewhere to sit when listening to lectures, but about 35% of the teaching was laboratory-based. Our labs were already filled to capacity in the mornings and afternoons by full-time students and in the evenings by part-timers, and we started to schedule lab classes for Saturdays.

By contrast, physicists, had lots of spare labs. Their department had been lavishly accommodated and equipped decades previously when particle physics was a glamorous subject. They missed the opportunity to re-direct themselves for the transistor and computer era, and now their student numbers dwindled dangerously. They jealously guarded their precious laboratories for which they had no use. The management did not want to know. What could we do?

Alan's solution was simple. He bought a few drinks for the Head of Physics who was relieved to let us borrow the labs informally but permanently, as long as we promised that we didn't ask for them to be formally assigned to us. Who cared that the plaque on the door said Department of Physics? We had two spacious new labs, and we even acquired access to their much-needed equipment.

Equipping our in-house factory

Our in-house factory was the key to save our sandwich course, but how were we to find the funds for furnishing it?

Alan came up with a solution only he could find. He brought the news that a large shop was closing down on the edge of Borough Market. I said he should try to persuade the owners to let us have the fittings at a knock-down price. Alan went one better. He suggested to the owners that we dispose of their 'rubbish' at a low cost. Instead of paying for the furnishings, they actually paid *us* to take away their shelves, benches, tables, chairs, even the contents of their stationery cupboard. Alan borrowed a few barrows from his friends in the Market, and the weekend saw a jolly gang of students dragging the furnishings of our in-house factory along the Borough Road, the payment received boosting our departmental petty cash funds.

A chair? No, I prefer to stay upright

During my early years at South Bank, I felt utterly alone. Perhaps this is why I accepted a part-time Visiting Professorship at City University, working with Professor Ludvik Finkelstein on Measurement Theory and teaching their MSc of Design of Quality Systems. But I believed in the mission of my department which was consistent with the original aims of the Borough Polytechnic Institute. I had no intention to leave South Bank. I was not motivated by money or status, so I turned down Deputy Directorships in four Polytechnics, including South Bank itself. On the other hand, I was interested in working as an academic, so when I was headhunted for chairs in universities, I decided to investigate. Here are some memorable instances.

In 1980, I was persuaded to put in for the professorial headship of a large department of a major university in the Midlands. I did not want the job, especially since we lived in Surrey, my

daughter was at school in Epsom, and my husband worked in South Hertfordshire. Our family was geographically challenged enough without me taking up a job in the Midlands.

The interview went well. Several members of the interviewing panel were professional friends with whom I had worked for years on IEE's Accreditation Committee. Three of them told me, independently, that I was indeed the candidate favoured by the panel, but the Rector vetoed my appointment with the words that "over his dead body" would a woman be in charge of his Electrical Engineering department.

Soon after this, another invitation came from the Vice Chancellor of a famous and geographically well-placed university, asking me to take charge of their large but almost student-less Physics department. The VC's strategy was simply to re-name the department Electronic Engineering and import my undergraduate and MSc course designs from South Bank. Who would teach these courses, I asked. The physicists, the VC said. I asked if I might interview them to see how competent they would be to do this. They are not *now*, said the VC, but you will soon bring them up to scratch. Not me.

There were two cases even more bizarre, but here I only relate one. The Dean of Engineering of a large university invited me to a Professorship which I was to occupy right away, without so much as an interview. The job was to run the first year of a two-year MSc. Who directs the course and who runs the second year of the course, I asked. "You would be the Course Director and there is no second year", said the Dean. "None of the students have enough English to pass the first-year exam, but their overseas fees help us run the rest of the faculty." I turned down a nice title and a cushy job at a much-increased salary.

The worst was a job opportunity which broke an important friendship, ending in disappointment in one of the leaders of my beloved profession. Professor X and I had known each other for over a decade, we had worked together and had become close professional friends. I admired him and he thought well of me too, so much so that he had trumpeted my fame half-way around the world. When I was headhunted for a newly created chair in a good university, I was intrigued: building a new department was a challenge, the subject was in my research interest, it was a job I might have been tempted to take. I asked Professor X, my good friend, for a reference – and he refused. I thought he was joking. No, he was serious. Why, what had I done wrong, I asked. Nothing, he said. "Your work is splendid and your energy admirable, you could do this job better than anyone I know, but you have no pedigree." I could not bring myself to ask what he meant by 'pedigree', and now I will never know. We never met again, and he died years ago.

In conclusion

From the distance of decades, it seems fortunate that I worked in a Polytechnic rather than in a university. Polytechnics were new institutions, not yet set in their ways, more tolerant than universities of new initiatives, new structures and new developments. Their student range was wider than that of universities, their high-quality sub-degree work allowing access to higher education for able people, young and mature, who would not have succeeded otherwise. Our tightly linked system of courses at South Bank exemplified this. My young staff and students, were second-chancers just like I was. We had nothing to propel us along the path of life other than talent, hard work and dedication. I am pleased and proud that I could help my staff to serve our students, and that, together, we were delivering a useful service to the profession and the community.

At one point, we were almost stopped in our tracks.

It might have been the introduction of a new value system that prompted some of my university colleagues to mount an all-out attack on the Polytechnics[11]. The plan was to turn them into sub-degree-level institutions. Polytechnics' right to run degree and postgraduate courses was to be withdrawn, and their degree and postgraduate courses were to be transferred to universities, their access to research funding was to be denied, and their existing research projects were to be

taken over by universities. In case of my own department, we would have lost our full-time and part-time degree courses, our MSc, our research projects and our MPhil and PhD students – essentially, our research school. We would have been left with teaching HND and HNC courses. The initiative had support 'from above' (meaning the Department of Education) the pressure was severe, the Polytechnics 'case was almost lost.

I should not have minded. By then, my consultancy commitments were multiplying, and my husband had left salaried employment to become full-time managing partner of Kaposi Associates. We were working on ever-growing and challenging projects as consultants for BT, Siemens and others, and our advice was sought by industrial, academic and governmental organisations in Europe and far afield. Instead, my loyalty towards the Polytechnics and their students induced me to join the fight, to defend the Polytechnics 'right to strive for excellence in all levels of higher education, in fair competition with universities.

A brave university professor, a Civil Engineer, emerged as the champion of the Polytechnics. With his help, we succeeded, the initiative was halted, but it cost my Civil Engineer colleague his health. No crippling ruling came 'from above', but an informal association was formed among the 'haves', to exclude the 'have-nots' from access to almost all research funding. In the same spirit, a decade or more later, the Russell Group was created [12], a Super League of universities of privilege, prestige and pedigree. Now I am too old to fight it, but not too old not to mind.

[1] https://www.ctbuh.org/people-profile/john-mizon

[2] A Kaposi: Yellow Star – Red Star, i2i Publishing, Manchester 2020

[3] See e.g. https://en.wikipedia.org/wiki/Polytechnic_(United_Kingdom)

[4] https://archiveshub.jisc.ac.uk/search/archives/bc66d2d1-211a-3b6e-9664-e5400104d131

[5] Then IEE (Institution of Electrical Engineering), now IET (Institution of Engineering and technology)

[6] Richmond, The American International University in London

[7] Engineering Mathematics Exposed. Mary Attenborough, McGraw Hill, 1994

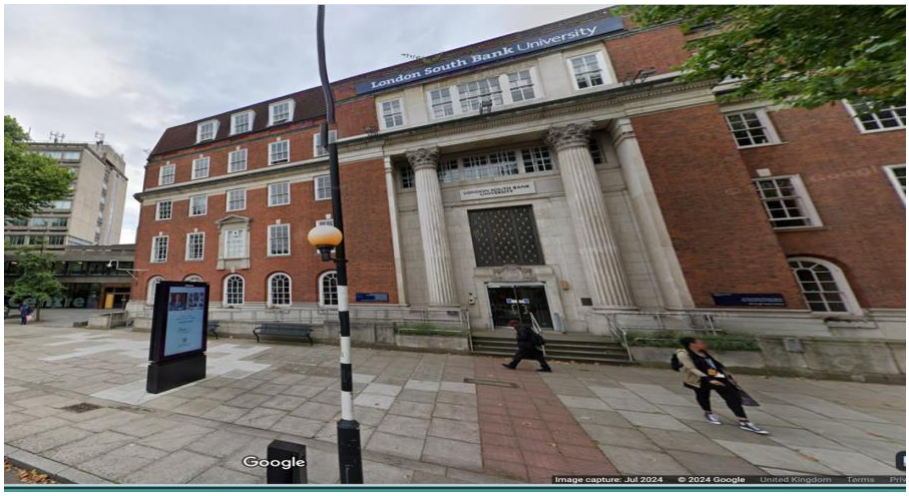
[8] https://en.wikipedia.org/wiki/Manpower_Services_Commission

[9] Anne Buckley: *Women in Electrical Engineering Education,* Int. J.Elect. Enging Educ., Vol.21, pp 197 - 212, Manchester U.P., 1984

[10] Ken Livingstone

[11] Margaret Thatcher came to power in 1979.

[12] https://en.wikipedia.org/wiki/Russell_Group



Borough Road entrance to London South Bank University The which, in my day, was called Borough Polytechnic.

Most of the large brutalist 8-floor building on the left of the main building is mercifully obscured by trees.
It is now the Student Centre of the University.
In my time it was the home of the Department of Electrical and Electronic Engineering.
The walkway between the two buildings was well named as the bridge of sighs.

About Dr Agnes Kaposi

Dr Agnes Kaposi, MBE, FREng is a Hungarian-born British engineer, educator and author. In 1971, Dr Kaposi obtained her PhD in Computer Aided Design. As a Churchill Fellow, she studied the role of women engineers in Communist and Western countries, and was the third woman to have been elected as Fellow of the Royal Academy of Engineering. She worked in research and education, and as a consultant to industrial organisations and universities in the UK and globally.

Dr Kaposi was born in 1932 to Hungarian-Jewish and socialist parents. Her family suffered from political and racial oppression, but only in the final year of the war did the Holocaust reach Hungary. Over the course of only two months, aided by the Hungarian gendarmerie, the Nazis murdered almost half a million Hungarian Jews. Dr Kaposi was there, witnessing the events. As a young girl she survived the Debrecen ghetto and worked as a child labourer in the camps of Austria, and she lost half her family.

Liberated from the camps by a the Soviet army, Dr Kaposi returned to Hungary where a Stalinist regime followed. In 1956, she graduated from the Technical University of Budapest with a degree in electrical /electronic engineering, contributing to the development of the Hungarian TV broadcasting infrastructure. After the 1956 Uprising against Communist rule, she escaped her native Hungary and obtained a labour permit to work in England as an industrial researcher in the Telecommunication and Computer industries.

In 2020, Dr Kaposi published her autobiography Yellow Star-Red Star, underscored by comments by the Hungarian historian Dr László Csősz. The memoir is a candid account of life in Hungary during and after the Second World War, when and her escape to Britain.

Dr Kaposi is an advocate for social justice, anti-prejudice and equality. She continues to be active in numerous Jewish and secular human rights organisations. Dr Kaposi gives illustrated talks and seminars at various organisations, including universities and schools, addressing scholarly and public audiences–a testament to her passion for knowledge-sharing and education.