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# A Partnership to Develop a Long-Term Plan to Overcome Skills Shortage\*

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This paper describes a partnership between a major multinational company and a higher educational institution to deliver a wide programme of on-site training.

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## PARTNERSHIP TO CREATE A LEARNING ORGANISATION

Bosch Cardiff is preparing for the new millennium. How? By ensuring that the workforce of some 1240 people are trained and equipped for increasing demands both on their skills and their commitment. The aim is to bring about real, substantial, and sustainable change in a large industrial company, through holistic and heuristic learning, not simply didacticism. In other words, Bosch is creating, step by step, a learning organisation.

What is a learning organisation and why do we think it is important? According to Pedler, Burgoyne and Boydel, it is:

*... one that facilitates the learning of all its members and continuously improves itself [1].*

Another definition, that of Honey and Mumford, is that a:

*learning organisation is one that creates an environment where behaviour and practices that involve continuous development are actively encouraged [2].*

What does this really mean in practice? It means that management has to create a climate in which people *want* to learn and *want* continually to improve themselves. According to Dan Jones of the Cardiff

Business School, today's organisations are *learning organisations*, but there is a paradox here [3]. Continuous learning increases expectations, but lean means less hierarchy, slimmer management, and therefore less opportunity for promotion, and realising expectations.

So what is actually needed is a method that allows individuals to grow, to increase their skills and knowledge and to enable them to contribute to strategic goals without necessarily promoting them. This applies both to management as well as technology areas, but in this paper the concern is with technical skills.

Bosch Cardiff, as a manufacturing engineering company competing in a global market, has to have a workforce with high technical skills, and also with the ability to flex their skills in line with changes in technology. It was quickly realised that, in order to do so, it was necessary to have a partnership with a local resource that could collaborate to build a learning climate; a partner that could collaborate to overcome the foreseen difficulties of special context, shift patterns and individual development needs.

It was necessary to create a new ethos with regard to training and training programmes, and to make people want to devote time and effort in a mentally taxing way in order to improve their skills.

That partner was University of Wales Institute, Cardiff (UWIC), a partnership that has been extremely successful for the last six years. The reasons for this are manifold.

First, because UWIC never dictated the content or the time. They tailored the programme to Bosch Cardiff's specific needs, looking at the equipment that

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\* A revised and expanded version of a keynote address presented at the *Global Congress on Engineering Education*, held between 6 and 11 September 1998, Cracow, Poland

was used in manufacturing.

Secondly, the staff assigned to the programme were hand picked for the ability to relate to and work with *grown ups*. This was particularly important given the high calibre of Bosch personnel and, ergo, the high demands placed on lecturers.

In his article *Teaching Smart People how to Learn*, Chris Argyrin identified that everyone has a *theory of action*, a set of rules that determines their ability to learn and absorb new information. This was apparent with the individuals working at Bosch Cardiff, manifesting itself in several self-imposed learning blockages, such as *I'm probably too old; I might not have the time; the others are smarter than me*. It also showed up in their preferred learning styles, whether they preferred to have a go or read the manual. UWIC lecturers were able to identify and deal with all aspects, recognising that they needed to treat each individual differently.

Third, was the Quality Assurance aspect, the constant maintenance of the level and quality of the programme. This was done by constantly reviewing, with lecturers, delegates and Bosch, the content and delivery. This programme then changed constantly in line with changing demands from individuals and technology.

Last, the flexibility. All customers universally judge suppliers on four factors. The first three were met, now it was the turn of flexibility. Ten years ago, if a college was approached with a request to work outside the normal working week, that request would almost certainly have been met with a stoney silence. At Bosch Cardiff, an extremely flexible approach was needed. Changes in manufacturing meant one to two, then three, then four shift, seven day working. This meant a great upheaval in a delegate's personal and industrial life, and therefore the ability to attend lectures and training programmes. UWIC's response has been to say *yes* first, then look at how to manage it.

## BACKGROUND

Robert Bosch Ltd is a major manufacturer of electrical and electronic subsystems for the automotive industry. University of Wales Institute, Cardiff (UWIC) is a major local provider of vocational education, and the partnership between these two organisations has now been in existence for a number of years.

As part of its role in the partnership, UWIC provides most of the technical training for Bosch's Cardiff plant. The training arrangement is primarily in the area of electrical and electronic engineering and provides for the delivery of the following programmes:

- BTEC NC Engineering

- BTEC Higher National Certificate (HNC) in Electronic Engineering
- City and Guilds 743 Quality Assurance

## BARRIERS TO PARTICIPATION

In relation to part-time education, there are a number of well-known barriers that have the effect of discouraging employees from taking up training and development opportunities. A particular barrier in a time of lean manufacturing units is the reluctance of companies to release students from their normal work patterns in order to undertake programmes of study.

In the context of the collaboration between UWIC and Robert Bosch Ltd there were two significant barriers that had to be overcome:

- The need to adopt new programme structures and ways of working that would permit employees to participate without causing disruption to normal working.
- Arising from the first, the need to develop a delivery strategy that recognises the particular demands that these new structures and ways of working would make on employees.

The training partnership has therefore had to abandon traditional approaches and, instead, develop organisational and delivery strategies specifically designed to overcome these barriers.

The key feature of the resulting strategies has been their flexibility. Each programme has adopted, as a basic principle, a flexible approach to learning that permits maximum adaptability in terms of delivery, yet retains a high level of individual tutorial support. This approach has been designed to accommodate the needs of Bosch employees, most of whom work to a shift pattern. To enhance further opportunities for study, most of the programmes are delivered on-site, in a specially equipped Training Centre.

## A FLEXIBLE DELIVERY STRATEGY

As indicated earlier, a key objective of the training partnership between Robert Bosch Ltd and UWIC is to increase the participation of employees in a variety of programmes.

The major elements of this training partnership are the ONC and HNC Electronic Engineering programmes. Key criteria for the success of these programmes are that:

- the employees are able to choose the course of study most appropriate to their own circumstances;

- the employees can attend their chosen course of study with little, or no, disruption to their working patterns;
- the programmes themselves are dynamic enough to be able to respond to changes in technology and changes in company practice.

A course delivery strategy was developed that was designed to meet the above criteria. The strategy was developed in accord with the *capability* approach adopted by other Electrical and Electronic programmes at UWIC [2]. The principle features of the strategy developed for the Bosch programme are:

- A series of introductory presentations made to all employees at the beginning of the academic year.
- Introductory counselling sessions for individual employees.
- A highly flexible timetable of lectures, study and laboratory periods.
- Fully documented learning material for all students.
- Extended programme time scales.
- On-site teaching, and laboratory accommodation.
- A regular and formal pattern of course review meetings.

The introductory presentations are given on a *rolling* cycle over a period of three weeks and are designed to outline the available programmes of studies to all employees. These presentations, together with the counselling sessions, provide the employees with the opportunity to examine the programmes on offer and, with specialist advice from teachers, select the programme most appropriate to their needs.

In order to allow employees to attend their chosen course without disturbing their normal work patterns, both the ONC and HNC programmes are designed to be delivered with maximum flexibility. This involves dividing each programme into self-contained modules, each consisting of one key lecture followed by a number of student-centred study sessions. A number of study sessions are provided on different mornings, afternoons and evenings throughout the week. Sessions are also offered on Saturday mornings (a rare provision in the UK). Employees are free to choose those sessions that best fit their current work commitments. Each key lecture is delivered twice, once during the day and once during early evening of the same week.

Each programme is fully documented and students receive a workbook for each programme module. The workbook consists of lecture notes, tutorials and laboratory exercises, and allows the students to pursue

their studies at a rate, and in a manner, which most fits their needs.

Recognising that Bosch employees would not be undertaking these programmes in the traditional *day release* attendance pattern, the HNC programme is delivered over an extended time scale. This allows them to take three or more years to complete their qualifications (instead of the two years that is normal elsewhere).

Bosch Ltd and UWIC also collaborated in setting up an on-site Training Centre to support these programmes. The Centre has been equipped with electronics laboratories and computing facilities that match those provided at UWIC. The Training Centre is available to all employees on an open-access basis. The Training Centre can thus provide on-site support for the student-centred sessions within each programme module. Employees thus benefit from access to such facilities close to their place of work (rather than having to travel to UWIC).

In order to produce programmes that are sufficiently dynamic to changing circumstances within the company, course review meetings are held regularly. These review meetings involve company training executives, teachers and representatives of the students. All current students are also consulted individually before each review meeting. Such meetings provide valuable opportunities for the operation of the programmes to be reviewed, problems to be raised and resolved, plans made for future programmes. Review meetings can also consider programme content and prepare proposals for change and/or updates to programmes.

## THE PROBLEMS ENCOUNTERED

The principle problems encountered over the past three years have related to the fact that employees have had to fit their training around their normal work commitments. This has led to difficulties in prioritising, particularly at times of heavy work demands or changes in shift arrangements. For example, employees can sometimes miss key lectures and/or study sessions through being committed to undertake overtime. The flexible time tabling and delivery strategy has been able to cope with such problems up to a point, but inevitably there are occasions when the individual study programmes are significantly disrupted, particularly through extended overtime.

The net outcome of the above difficulties has been that these programmes have suffered a dropout rate higher than is normally the case for more traditional *day release* type programmes.

Thus, although the training programmes have encouraged increased student participation, there has been a cost in terms of the number of participants whose enthusiasm had initially been engaged, but who have subsequently failed to achieve their goals.

## CURRENT DEVELOPMENTS

Robert Bosch Ltd and UWIC are now discussing a programme to upgrade the qualifications of all technical staff to at least BTEC National Certificate (NC) or NVQ II/III level. In this context the partnership has been extended to include a local further education institution that has been contracted to deliver the NC and NVQ elements.

Discussions are also taking place on extending the partnership to encompass a part-time BSc in Electronic Engineering for those employees successfully completing the HNC programme. A BTEC Professional Development Certificate is also being developed to cater for career development.

Another development under consideration is the use of work-based learning contracts within the programme that would allow students to capitalise upon learning opportunities in the workplace [3].

In general, there is likely to be a shift within the programmes to encourage employees to become more pro-active in their own professional development by deciding for themselves what knowledge, skills or competencies they require, and to determine which programmes suit them best. This continued shift of emphasis from teacher to learner reflects experiences elsewhere and is consistent with the Institute's commitment to the philosophy of education capability.

## THE EMPLOYER'S PERSPECTIVE

Over the last several years, the focus for industrial change has been around *lean manufacturing*, the whole philosophy being that of minimal staffing of companies, both hierarchically and horizontally [4]. This has obvious benefits for productivity and cost management. However, implicit in this is the fact that staff at all levels in the organisation must become more flexible, if not multi-skilled, so in essence the equation now reads *fewer but better trained people equals higher productivity and cost-effectiveness*. However, the idea that employers can always recruit the skills they need is a very tenuous one. During the last five years it has become very apparent that no matter how highly skilled an employee may be from a previous job, specific training will again be required if they are to fit into the new, flexible role expected of them in the new,

lean organisation.

This however leaves companies in the classic Catch 22 situation. Because of the decreasing number of employees and the greater demands on the ones that are in the organisation, the ability to release people for training becomes increasingly difficult.

It is therefore necessary to find a solution that will provide training and education in the workplace that suits the needs of the employee, the requirements of the business plan and overcome the obstacles set up by shift patterns. The solution for Robert Bosch Ltd was a partnership with UWIC.

The company believed that the way forward was to offer training at two levels, access to higher education and/or BTEC HNC, and to offer training on-site.

As a first stage, notices were displayed offering these new opportunities to all employees. UWIC then gave a series of presentations to those interested. One of the attractions offered by the UWIC programmes was the ability to cater for students with different academic backgrounds by providing multiple entry points to the programme.

The initial response was very high, about 20% of the workforce. However the initial dropout rate was also high. Although disappointing, this was not unexpected and may be put down to a number of factors. One factor was the shift patterns worked by the staff (or simply the fact of working shifts). Another common factor was the overestimation by employees of their personal ability (and related underestimation of course content). Yet a third contributing factor was the inability of the company to guarantee a higher technical job on completion of the training period.

On the positive side, those that stayed with the courses have gained a considerable amount both in academic ability and increased competence in the workplace. This is precisely the aim of the training programmes.

As stated earlier, Bosch Ltd installed several UWIC designed technical laboratories on-site. In addition, the company loaned UWIC several state-of-the-art training rigs to enhance training at the college.

## CONCLUSIONS

The partnership is proving to be highly successful, meeting both individual and corporate training needs. It provides Bosch and its workforce with training programmes that:

- are flexible enough to meet the various shift patterns and to overcome the inability to provide day release for employees;

- are dynamic enough to change as technology in the company changes;
- offer the opportunity for personal development for individuals.

Both Bosch Ltd and UWIC believe that the partnership offers a model of good practice in relation to collaboration between education and industry in the field of technical training.

This partnership has been empirically successful in that it has grown a number of technicians from within the workplace. It has also been successful in a more qualitative way, in that it has created a culture of continuous learning. It is intended to build on this in the future, growing more and more skills, rather than recruiting.

## REFERENCES

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## BIOGRAPHIES



David Michael Holifield, BSc (Hons), CEng, MIEE, PGCE (FE), is a Senior Lecturer in the School of Product and Engineering Design, University of Wales Institute, Cardiff; Course Director of part-time courses; and Industrial Liaison Officer.

As Course Director and Industrial Liaison Officer,

Mr Holifield sets up short course training and main stream education for various companies to fit their needs, ie training needs analysis. He also develops strategies for the long-term needs of companies, marries company training to nationally recognised qualifications, and subsequently manages these programmes of study.

His career began in industry at the age of sixteen as an apprentice electrician for British Steel; he progressed to become an electrician, then junior engineer and finally an engineer. He was a research associate

for three years and undertook research into pulse magnetisation of amorphous ribbons for MoD at UCC. He has produced several publications/presentations about training and education within and for industry.



Simon Hotton Bichard, BSc (Hons) Applied Physics, CPhys, MInstP, is a Senior Lecturer in the School of Product and Engineering Design, University of Wales Institute, Cardiff. He joined the University in 1982 as a lecturer in electrical engineering, and has been particularly involved with many

aspects of the development and delivery of part-time courses. This has resulted in several publications and presentations.

His career started at the Ministry of Defence, where he was employed as an Assistant Experimental Officer and sponsored on an industrial based degree course. He subsequently worked as an R&D Engineer for ITT (Semiconductors) Ltd and then taught 'A' Level Physics for several years at a college of further education. Prior to his present post he was a senior engineer with the British Steel Corporation, working with a company that provided and developed plant condition monitoring services for use by a wide range of industries. His particular interest and responsibility was in the development and use of thermal imaging techniques. This work resulted in several publications in national and international journals.



Nigel Thomas, RBGB-CF/PER, is a Training and Development Executive at Robert Bosch Ltd, where he has held the position for the past nine years. In that time he has created a unique training environment within the company, where he has formed highly successful, long-standing relationships

with many local educational bodies, including UWIC and the University of Glamorgan. 20% of the Bosch workforce is currently working towards a nationally recognised qualification, sponsored by the company, but working in their own time.

His career background is not typical of a training manager. After leaving school he undertook a traineeship as a metallurgist with British Aluminium Company, before joining TRW Cam Gears, where he

stayed for eighteen years. His career at TRW started on the shop floor, moving through quality, into management and was then seconded to the training department, where he became hooked. He was instrumental in introducing quality circles into TRW and then was part of the team that introduced JIT and cellular manu-

facturing as part of a major organisational change.

Three years ago he embarked on a PhD programme, researching leadership and organisational change, which has engendered some radical changes in thinking about the shape of companies in the new millennium.