

Training and Education should be everyone's priority

by Simon Campbell-Whyte, DCA Executive Director



ONE CORE ASPECT of the DCA mission is skills and training. As Andrew Stevens points out in his article in this issue, no one can deny this is not only essential for keeping our current data centres trouble free, but also absolutely crucial for the sustainability of industry. The DCA

has undertaken a great deal of research, experimentation and consultation, both within data centre circles and also by reaching out to stakeholders, especially during last year's PEDCA project which developed an "action plan" recently approved by the Commission.

With the DCA Data Centre Certification Scheme now underway, the timing is now right to respond to challenges uncovered by the PEDCA project to help the industry address these issues. The aforementioned Certification scheme covers the main "four pillars" of customer demand, i.e. reliability, energy efficiency, operational professionalism and access control security.

Already, the requirements of the scheme address the need for appropriate professional development processes, but the next logical step forward is to add further guidance for the appropriate qualifications and types of training that should be undertaken.

Understanding the differences between qualifications and certifications of training and also the differences between training and education are also absolutely fundamental as Dr Rabih Bashroush points out in his article.

Developing agile ways to encourage a greater pool of industry new entrants with the talent and basic knowledge needed to enter and help sustain our industry's growth is also a priority.

The pilot activities of the DCA "boot camps" provide us with a basis to move forward to develop more permanent solutions and I'm looking forward to working with DCA members on these challenges throughout the next few months.

In fact a good example of the impact of some of these activities is illustrated by a former "Bootcamper" Nigar Jebraeili who was inspired to follow a PhD related to data centres.

As Andrew points out and our PEDCA project showed, training staff motivates employees and INCREASES loyalty. Compare the attitude to training in Europe to the faster growing and larger economies around the globe – So in the meantime DCA members should keep abreast of available training courses posted to the DCA Community Calendar and book accordingly.

Protecting the future of the data centre industry

By Andrew Stevens, CEO, CNet Training



IT'S A KNOWN FACT that the growth rate for data transfer across the globe is accelerating at an enormous rate year-on-year. So, the industry is

booming but what are the challenges this presents and how can we overcome them?

The cost of getting it wrong

Outage figures are incredibly high with the latest figure being \$7,900 per minute. This, coupled with the fact that 91% of data centres have experienced an unplanned data centre outage in the past 24 months, not only highlights the astronomical cost of an

outage, but also suggests that the chances of it actually happening are surprisingly high.

Added to this, the fact that one of the main causes of a data centre outage is human error, one wonders why more data centre managers do not follow a plan for on-going professional training and certification with their staff, especially considering that the cost of just one minute of a data centre outage could pay to train, qualify and professionally certify two data centre technicians.

Spreading the education word Professional training and education and embarking on a structured approach to career development enhanced by professional qualifications and industry recognised certifications allows data centre



managers to be confident that the data centre is in the right technical hands. There are also many other benefits too:

- Staff retention and loyalty
- Enhanced employee satisfaction and increased morale
- Increased employee contributions due to the added confidence and new skills after training
- Training return on investment

But most importantly is the fact that with more individuals benefiting from being professionally qualified and certified, it will have a knock-on effect on the entire data centre industry.

There will be enhanced quality of service, continuity of service, less outages stemming

from human error and overall an added confidence throughout the industry.

Make it a wise investment

It's not just about training, it's the right training and the right investment. Businesses and individuals need to be reassured that they are investing in the right data centre training programs for their needs and that they are undertaking their data centre training with the right professional organisation - one that allows delegates to benefit from receiving the right technical knowledge and awards both industry and globally recognised qualifications and certifications.

CNet Training is a perfect example of such a company, having been delivering professional industry training for nearly 20 years and having built a trusted reputation across the globe for delivering high quality training throughout the entire data centre industry. The CNet team are also the originators of The Global Data Centre & Network Infrastructure Framework that allows data centre professionals to map training to meet their requirements.

The Framework includes professional training programs spanning all technical requirements of a data centre, from professional design and technician programs, such as their Certified Data Centre Technician Professional (CDCTP®) and Certified Data Centre Design Professional (CDCDP®), to the more focussed data centre management, energy and audit programs and now to the world's first Masters degree in Data Centre Leadership and Management.

The responsibility of the Data Centre Alliance and its members

The DCA has a responsibility to its members to provide support across all avenues and this includes working together to help create sustainability throughout the industry and protect its future. Not only do we need to encourage new entrants to the industry to reduce the skills gap and replace an ageing workforce, we also need to ensure all those working within the industry realise the value of the right education and the benefits they could gain from it. It is an investment however the returns far outweigh the risks of relying on a team of untrained staff.

Working together, with the right education, industry recognised qualifications and official certifications, the future of the data centre industry will be far stronger.

Educating undergraduate mechanical engineers

By Dr Jon Summers, University of Leeds.

MOST UNIVERSITY mechanical engineering programmes involve aspects of heat transfer, heat exchangers and fluid transport by pumps and fans, but the context of these fundamentals to the thermal and energy management of microelectronic systems is rarely addressed. Quite surprising since the entire digital infrastructure of today relies heavily on such mechanical engineering fundamentals and principles.

Since 2010, the School of Mechanical Engineering at the University of Leeds has been running final year undergraduate team projects that expose students to the thermal and energy management of data centres. These team projects usually involve four students working together on a common goal for the project and this goal is underpinned by important pillars that are addressed by each of the students.

The students do not take long at the beginning of the project to unearth the peculiarities of data centres, such as the many key performance indicators, or that many aspects of the critical infrastructure of data centres are perhaps over-engineered. The educational process of investigating the technical aspects of data centres, such as the unequivocal need for cooling and power distribution, does indeed make sense to students and they can relate these technical

requirements to their engineering science knowledge and background.

What is a surprise to these teams is the way in which data centres are treated as mission critical, which therefore introduces the students to the concepts of redundancy, resilience, reliability and availability.

In addition, students are also surprised at the sheer energy demand of the data centre sector and when they discover the sector's current growth rate they then appreciate the need for sustainable or energy efficient solutions.

Before discussing briefly the topics addressed by these undergraduate team projects, it is important to highlight that industrial mentors are instrumental in the educational process, since they bring important context, knowledge and experience. At the University of Leeds we have been fortunate to have visiting Professor Ian Bitterlin (Critical Facilities Consulting) provide insight to many of the team projects as well as providing tours of data centres in the early years, also to Dr Robert Tozer (DC Operational Intelligence) for demonstrating aspects of air flow and covering issues of risk management, Dr



Adam Beaumont (aqf) for detailing the many aspects of data centre design and operation, whilst also providing data centre tours, and Peter Hopton (Iceotope) for introducing students to the exciting technology of liquid cooling.

Since 2010, there have been five undergraduate team projects, each with four students. The first project was inspired by a brief encounter with a local data centre. The industrial requirement was to analyse the EU code of conduct for best practices in data centres and provide insight into an assessment provided by a third party methodology.

The team became well versed in the code of conduct and apportioned the different

sections of the code for analysis in the context of the local data centre. The second team were inspired to look at what are the constraints of geographical positioning of a new data centre. In this case the team developed some software that worked out an optimal location based on power availability, connectivity and the local annual environmental conditions. The last three team projects have focussed their efforts on air flow, its losses and energy considerations. In particular, an experimental "server" wind tunnel was constructed to determine the influence of facility fans on the duty cycles of typical server fans when the cold aisle was maintained at a higher pressure than the hot aisle.

With the in kind support of Future Facilities,

students working on these airflow management projects have been introduced to industry standard software. The successful completion of these undergraduate team projects provides graduating students with a well-rounded insight to the engineering challenges and requirements of data centres, so much so that some of these students have actually been employed directly by companies working in the data centre sector.

We cannot stress strongly enough the importance of industrial mentors and therefore if you are interested in becoming involved in our programme of undergraduate team projects, please get in touch on **+44 (0)113 343 2151** or email at **j.l.summers@leeds.ac.uk**

Data centres are the life support mechanisms of a modern digital society



By Nigar Jebraeili, PhD Candidate at University of East London.

IT IS TIME TO DEFINE a formal educational path for the executives of a critical industry. IT engineers apply their skills to bodies of data trying to make sense of organisational or human behaviour and movements of goods & assets. We thus need to solve puzzles or shed light on the unknown through organising the known.

The ever expanding role of data & communications has now created a cross road where we are facing the challenge of synthesising three diverse set of circumstances which call for a new training paradigm. We therefore have to address the educational needs of a group facing:

- Technical diversity of tasks to be performed;
- Divergence of personnel skills;
- Heterogeneous physical conditions of Data Centres;

When I started my PhD in Data Centre

Energy Efficiency I was taken aback by the variety of skills required for running these establishments. As if IT disciplines such as hardware deployment, networking, software development and security were not enough, I came across a whole host of others. Data Centres were also the business of:

- Utility engineers dealing with HVAC, cooling, etc.;
- Electrical engineers attending to switchgear, auxiliary power;
- Communications & telephony specialists;
- Real estate and geologist specialists;
- Architects;
- High level physical security experts and much else.

Constructing a Data Centre is of the same order of magnitude as any other complex industrial facility in need for a range of professionals, tackling anything from the selection of enclosures, bus-bars to distribution processing, secure capacity

allocation and virtualisation etc.

As a PhD candidate "learning" is my "vocation", so when the chance arose to attend the Data Centre Alliance boot-camp I jumped at it, thinking it is another learning opportunity, however the un-expected came in the first hour. Here we were a group as heterogeneous as the needs of Data Centres! Amongst candidates, I came across a Marine engineer, a couple of war veterans, network engineers, electrical engineers, IT generalists, and some PhD candidates with IT & Data Centre focus, who were joined by few Data Centre sales executives.

The fast growing Data Centre industry is short of skilled and experienced people to address its needs and clearly we are all coming to help & earn our living in this space but how does one teach and train such a diverse groups of people? What is the common experience and language among these foot soldiers of modern life?

The challenge for the boot camp seemed to be how to develop a thread which complements the skills of all; educates at various levels while maintaining cohesion and relevance to such a diverse group. In the end, it appeared that these objectives were accomplished through:

- Having teachers/leaders of equal diversity but with similar industry focus.
- Observing and learning the reality of Data Centres through physical inspection and empirical observation.

Diverse lecturer backgrounds included: University Professors, Senior Data Centre Industry Executives, Data Centre Engineers,

and Professional Data Centre Trainers and of course DCA Directors themselves.

The topics presented included:

- How the Data Centre industry was born (its history, development & current state);
- Basic functions of a Data Centre & its critical parts;
- Standards, Regulations and processes;
- Cloud computing and its role;
- The need for facility changes and the resulting consequences;
- Virtualisation;
- Sales and Marketing;

To finish, we had physical visits to two sites: One was a purpose built facility and another a converted office building block. One cannot but be fascinated by the range of parameters to be considered by a property surveyor when the land or the office block is being offered for Data Centre use. The contrast between the development of a virgin site & the adoption of an office block needing an innovative approach to space utilization is educational in itself. This issue could range from allocation of designated areas to supply of fuel, standby power, access & security or electrical distribution network, etc.

Finally post completion of the installation of a Data Centre how one argues for the merits of one vs site the other? How the two different groups of executives who promote these facilities, have to convey the comparative benefits of the two diametrically different sites to prospective customers.



To me, the set-up of this boot camp made the necessity of a new academic curriculum transparent. Addressing the needs of the industry for talented individuals, entails formal and structured trainings of appropriate human resources. Somewhere between a field engineer's perspective and professional academics, we should find answers to the needs of an industry which is still busy defining itself. We all know what a carpenter, electrician or a medical doctor is, but what is a Data Centre executive? While we have a name for this critical infrastructure facility,

perhaps it is time to cast a cohesive form for the participants & articulate their careers more formally.

With the DCA boot camp taking the first steps to fill this gap, we now see our universities have a role in conceiving a formal structure for teaching what is now a way of life and a core part of our modern social structure. We have already seen the first such steps and no doubt many other universities should join this trend to serve the demands for personnel in this young industry.

PTS perspective



Bridging the IT and facilities skills gap in the data centre.
By Steve Bowes-Phipps – PTS Consulting Group

PTS CONSULTING has been involved with the DCA from the beginning, and has a place on the DCA Governing Board. As a truly independent consultancy, PTS works with a multitude of clients on a wide range of transformative business and IT projects, specifically around data centres and is one of the DCA's accredited assessors for its certification programme.

I've been personally and intimately involved with Data Centre operations for over 20 years and for at least the first five years, I didn't think about power and cooling at all. If I wanted to put a new cabinet or server in place, I contacted Facilities and they sent a

"sparky" (electrician) over. If the Data Centre went down, it was bad but not catastrophic as most critical processes could be run on paper. However, something changed from around the late 1990's; 1U and 2U "pizza box" servers started to replace the mainframes and minis that the likes of SUN, IBM and HP sold in their enterprise ranges. You could (and people often did) stack them high in a 42U cabinet, resulting in the consumption of considerable amounts of power and putting out a fair amount of heat in a relatively compact space. Everyone started to talk about "power consumption" and "kW/rack", but the job of Data Centre Manager and Facilities Manager were still quite distinct.

As the Noughties progressed, Data Centres were gaining recognition as the engines of growth for organisations and national economies. Yet they could no longer sustain the massive demand for power and the consequent exhaust of thermal energy emitted as new servers hit the market. Eventually, in the late part of the decade, the Data Centre industry started to investigate how power and cooling capacity could be minimised in Data Centre operations, culminating in an EU Code of Conduct for Data Centres issued by the European Commission and the Green Grid organisation giving birth to the Power Usage Effectiveness (PUE) metric as a way of measuring a Data Centre's use of power.

This new focus on energy efficiency brought the roles of Facility Manager and Data Centre (i.e. IT Operations Manager) into either congruence or conflict. In order to enact Best Practices, a holistic view of the Data Centre was required, but few organisations reacted to this by combining both roles. I have seen a lot of Data Centres in the last eight years and, without any exception, I can honestly say, I have yet to see a well-run facility where the Data Centre Manager does not have complete control over all operational and infrastructural aspects of the Data Centre. In fact, the more separated the roles of Facility Manager and Data Centre Operations Manager are, the more likely a Data Centre will be very inefficient and ineffective, putting at risk an organisation's entire business through lack of full control, focus and total oversight of performance.

There is a very simple reason for this: Facilities Managers rarely have the IT skills to understand what happens within a Data Centre. Although Data Centre systems (plant and equipment) appear to be similar to general office systems, they are operated very differently and usually at a scale far removed from keeping human beings comfortable and safe. Similarly, IT Operations Managers often lack the skills possessed by Facilities Managers. Speaking as a Data Centre Manager who came from the IT side long ago, decisions are often made that intuitively seem to make a lot of sense, but in reality go against good engineering principles and practices, resulting in poor Data Centre performance.

If your organisation is completely reliant on the business services driven from your Data Centre(s) (and let's be honest, those services are in a Data Centre for a reason – they're important!) why would you not want to have one person responsible for all aspects of it? Having a Data Centre Manager provides a focal point for innovation, process and procedures, and, more importantly, maintains availability and reduces cost of ownership. Combining the roles and providing the training and hands-on support for existing Data Centre Managers to bridge this gap is important, but needs to be looked at in context with a well-run operation that also has sound business practices such as a Data Centre Change Advisory Board (DC-CAB), a well-documented, agreed and widely disseminated Data Centre Strategy, and rigorous controls over access and implementation processes.

Education, training and awareness: what does it really mean?



By Dr. Rabih Bashroush, University of East London

MANY PEOPLE confuse these terms or understandably assume they mean the same thing, but while the data centre sector and the DCA moves to address its needs, it's critical to understand that there are very clear differences. The terms of training, education and awareness are often mixed, and the terms used interchangeably.

Although choosing the right training or education program doesn't need to be a laborious process; there is a need to clearly understand the very fundamental differences between them and the benefits associated with each.

Training and certification

Training provides candidates with skills and knowledge that are associated with state-of-the-art technologies and best practices. Training usually focuses on the 'How', and

is often acknowledged through certification. Professional certification proves that an individual has completed the learning process and achieved the stated objectives. It can provide post nominal letters to use after the delegates name. Certification is unique; it shows a commitment to life-long learning, as re-certification is often required every few years due to ever evolving technologies and best practices.

Benefits for the employer

- Employees' skills are enhanced every few years with new learning to bring staff's knowledge up-to-date with the very latest changes and technical developments within the industry.
- Ensures employees are abreast of the latest working standards and codes of practice

- Allows training budgets to be forecast accurately on an on-going basis

Benefits for the employee

- Provides an evidence of skills and abilities
- Keeps knowledge and skills in line with latest industry requirements
- Provides a post nominal title, e.g. John Smith CDCDP®

Education and qualification

Education, on the other hand, provides candidates with insights and understanding of theoretical underpinnings behind most technologies. Education focuses on the 'why', and is often acknowledged through Qualifications that are valid for life. They also differ from certifications in that they are tightly controlled by professional bodies and only accredited providers can award

qualifications. They are mapped to the International Qualification Framework and therefore recognisable across the world.

Benefits for the employer

Ensures your employees are educated to a specific level
Incurs a one-off fee as there would be no need for renewal to maintain qualifications
You can be assured that the provider maintains a high professional standing as the criteria for gaining accreditation is often thorough and require the provider undergo strict quality assurance procedures

Benefits for the employee

Provides official recognition for your abilities
Does not require renewal to maintain
Is recognised globally and can be mapped to international frameworks; hence, can be easily transferred to other countries.

Awareness

Finally, awareness provides target audience with information about a topic to help them



recognise its importance (e.g. Energy Efficiency, health and safety, etc.). Awareness is usually about the 'why' and largely delivered through videos, newsletters, posters, seminars and other types of campaigns (e.g. printouts on shirts, mugs, etc.).

Together, training, education and awareness programmes can provide a very strong framework to up-skill and retain your work force, increase your organisation's capabilities, and drive professionalism.

Filling the data centre skills gap: Are for-profit training providers making the grade?



A Viewpoint by Lee Funnell CDCDP, CTP,
EMEA Technical Manager for Siemon.

In 2012, a DatacenterDynamics Industry Census showed that 60% of data centre operators were very concerned about a lack of suitably qualified individuals to maintain their facilities. Some believe that this stemmed from a lack of graduate-level education specifically geared towards a career in the data centre industry, as well as an overwhelming number of highly experienced data centre professionals who have reached retirement age.

When we consider the rise in data centres and their net worth, it is surprising that more academic institutions are not offering tertiary data centre education. However, that trend is changing as more courses from academic institutions and self-governing associations offer accreditations and qualifications. For example, Leeds University in the UK has made progress with several postgraduate

students completing data centre-specific dissertations and there has been discussion surrounding a specific master's degree in data centre design. And just last year, the University of Leeds was awarded two multi-million pound grants to become a major centre for big data analysis and national resource that can be used by academics.

While these changes may eventually lead to a pool of highly qualified individuals, the need for seemingly educated individuals combined with the continued growth of data centres has created a high value opportunity for for-profit training providers to develop and create courses that cover the concepts and the elements contained within the data centre facility. This includes security systems (physical and electronic), power distribution, cooling and air flow management systems, fire suppression and detection, and active

components such as switches and servers. It also includes the cabling infrastructure that provides the means for data transmission itself.

Most of these for-profit training providers have developed a range of courses that cover all of these data centre concepts and elements. The duration of these courses typically ranges from either a few days to a maximum of two weeks. Whilst one could argue that all of these data centre concepts and elements are not extremely specialised skills, there is an industry-wide concern as to whether these courses actually provide enough detailed information to provide students with a true understanding of each technology.

Many of us agree that courses from most for-profit training providers provide only a basic overview of all of the various disciplines used to build, develop and maintain the data centre itself. These training providers exist to make money, and we are supposed to be able to rely on them to provide employees with the education they need to support the data centre environment. However, I question if one day spent discussing electrical power

distribution, UPS and emergency backup systems provides adequate long-term and real-life knowledge above and beyond very basic information. Would you trust your data centre uptime to someone who only spent a day learning about electrical power?

In my opinion, for-profit training companies who provide data centre training courses should be honest and market their courses as a data centre overview course rather than using terminology that implies their courses result in professional status. When we consider the complex series of concepts and elements that make up a data centre, professional status simply cannot be achieved in just a few short days of training.

Thankfully, we are extremely lucky in this industry to have access to excellent data centre design and build firms who, through years of practical hands-on experience, have developed specialised teams with real product and design knowledge.

These firms can fully design elements of the

data centre based on experience with various manufacturers' systems and tailored training. As many of these expert engineers enter into retirement age, internal mentoring within these design and build firms will be critical.

I strongly believe that manufacturer training is also vital to help fill the data centre skills gap. Manufacturer training is specific to groups of products that have either been specified by the client or by the specialised teams of the data centre design and build firm.

Product training from selected and approved manufacturers is aimed at those with the level of skill and knowledge needed to deliver the system in a way that ensures reliability and performance.



Whenever we consider the virtues and benefits of data centre training, it is important to remember that the primary function of data centres is to move and store an increasing amount of data quickly and securely, whilst maintaining the highest possible level of uptime to ensure that all of its services remain available to all internal and external users. This primary function should be the core foundation of any data centre training program.

Aimes Grid Services data centre awarded DCA certification

Liverpool based data centre operator, AIMES Grid Services, has been named as the first data centre in the European Union to be awarded the new Data Centre Alliance (DCA) Certification. Having successfully passed a rigorous data centre audit carried out by the industry body in conjunction with a member of its approved expert firms, Certios, AIMES was awarded the level 3 classification for its award-winning facility at Liverpool Innovation Park.

The certification, developed by DCA members, provides industry with a clear set of criteria designed to embrace existing codes and standards of best practice to assess the quality and resilience of a data centre facility. AIMES, whose customers include Everton FC, Atlantic Container Line, SPHERE, Liverpool Heart and Chest NHS Foundation Trust and the Federation of Small Businesses, received the 'class 3' rating after being monitored for its resilience in power distribution, connectivity and cabling and environmental control (cooling).

Michael Walker, Project Director at AIMES said: "As a leading data centre in the North West, these accreditations reflect the operational integrity, energy efficiency and site security we have here. The addition of the EUCOC and DCA accreditations to our NHS Information Governance and ISO27001 certifications demonstrate our commitment to striving to meet the highest level of industry standards. We continue to invest in our infrastructure, our staff and technology to assure current and prospective customers of our ability to deliver a level of service and uptime to be expected."

Former Cabinet Minister, Data Centre Alliance President and Virtus Chairman, Steven Norris said: "As our lives and economic futures now depend on safe, reliable and efficient data centres, it is high time we recognise and highlight our industry's commitment to excellence, energy efficiency and professionalism. On behalf of the



Picture: DCA Accreditation Board Chairman Peter Higgs (right) presents Aimes Grid Services Programme Director, Michael Walker with the Certificate.

DCA, I congratulate AIMES, their team and the City of Liverpool on this achievement." Uniquely, the DCA Certification is the only scheme that requires the implementation and participation of the Code to be verified and regularly checked at the data centre thus providing an essential extra layer of confidence to users and customers.

The company which operates two data centres – Baird House and Kilby House - has also become a participant in the 'European Code of Conduct on Data Centres (EUCOC). The code was created in response to increasing energy consumption in data centres and the need to reduce environmental impacts in relation operating a data centre.