Raising Awareness of Green IT - The BCS Way

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Abstract

The paper discusses the actions that are being undertaken by the British Computer Society (BCS) to raise awareness of green computing with end users, SMEs and large organisations. The two BCS Specialist Groups, the Green IT SG, aimed at end users and SMEs, and the BCS Data Centre Specialist group, aimed at the larger organisations' data centres are described. The need for green computing qualifications is discussed together with the proposed qualifications targeted at end users, home users, teachers and SMEs.

1. Introduction

There is an ever increasing need for both organisations and individuals to consider reducing their Carbon footprint. In this time of recession organisations are under pressure to become more efficient by reducing their costs and overheads – it is increasingly clear that reducing energy consumption and increasing the efficiency of organizational processes can and should go hand in hand with environmental initiatives and carbon emission reductions . Computing has traditionally been seen as providing organizational efficiencies but now needs to be considered in a broader scope. Whilst attention needs to be paid to reducing the footprint from using ICT - various statistics have been produced indicating that the Carbon Footprint from data centres is equal to or higher than that from the aircraft industry (reckoned by many to be around 2% of global emissions) - ICT is now also identified as a major enabler of Carbon Footprint reductions that can far exceed the emissions from its use.

Businesses are facing various pressures from their stakeholders, customers and governments to reduce their environmental footprints. The launch of the UK HMG Green ICT Strategy in July 2008, set a target for Carbon neutrality by 2012 for ICT in use across the Government estate, which will cascade sustainable and green computing issues down to local departmental and agency offices and services, including hospitals, Local Authorities and education establishments. With the UK Public Sector spending some £12bn per year on computing, this development will also put pressure on national and local IT suppliers engaged with the public sector to provide products and services with smaller footprints and good sustainable lifecycles. As for the 98% the upcoming UK Carbon Reduction Commitment will require all organizations consuming over 6,000 MwH of half-hourly metered electricity (excluding those already covered by Climate Change Agreements or the Emissions Trading Scheme) to participate in a cap and trade scheme – it is expected this will encompass all central government departments, supermarkets, banks, water companies, education establishments and local authorities [1,2,3].
As recently identified by the European Commission in its launch of CleanTech a cross-EU initiative that seeks to harness the power of ICT to assist states in delivering the EU 2020 targets saving 20% of primary energy consumption, reducing greenhouse emissions by 20% and raising the share of renewable energy to 20% [4]. ICT is now accepted as a key tool for reducing the overall organization footprint, sometimes to the extent that can justify increased ICT investments. Non governmental organisations have also identified the key role that ICT has to play in bringing about a sustainable society including the World Wide Fund for Nature [5].

With recent more pessimistic predictions on Climate Change and the success of the Act on CO2 campaign, there is now increasing interest and expectation from the general public around the green agenda. A recent survey of impacts on a Company's share price from breakdowns or exposures of weaknesses in the sustainability of their supply chains, revealed that such failures often resulted in significant share price reductions (M&S), so companies are now increasingly having to mitigate risks of unsustainable supply chains to sustain their value to shareholders. Shareholder scrutiny of these types of issue is increasingly present at institutional investor level through initiatives such as the European Social Investment Forum [6]. Thus pressures on UK businesses are coming from all quarters and carbon reductions and sustainable operations are becoming "de rigueur" for a running a successful business

With Government setting the longer term target for HMG of neutrality across the lifecycle for ICT by 2020 and the wider target for UK PLC of reducing our footprint by 80% by 2050, this is to be an important focus for BCS work for some time to come This focus is on continuing to build the external image of BCS, contributing to improving access to information, knowledge and skill relating to green issues, particularly for end users, teachers, academics and the general public, using mainly free events, and freely available online resources.

The British Computer Society has been focusing efforts on promoting technology, knowledge and process improvements to reduce the inherent footprint from using ICT and in seeking the more efficient use of computers both to reduce overall organization footprints through energy and other resource efficiencies, and to provide people as home users and employees with greater choice as to how they work, where and when

2. BCS Activities

For a number of years, various sectors of the BCS have taken positive actions to promote the effective use of computers and to minimise power consumption and Carbon emissions. The BCS Carbon Footprint Working Party, led by one of the authors, Bob Harvey, was set up by the BCS Ethics Forum to identify issues of concern relating to green computing, both from individuals and organisations. There is a need to align work across existing BCS Specialist Groups and other parts of the BCS, to provide a focus and co-ordination for their development by building a common agenda and forum. There is the availability of existing infrastructure within the BCS with capacity to support this work

The BCS Data Centre Specialist Group played a leading role in the EU's creation of its Code of Conduct for Data Centres and has now developed a tool to help members and industry to plan and measure the power of data centres. More recently a BCS Carbon Footprint Working Party initiative has led to the formation of a new BCS Green IT Specialist Group. Its activities have included producing the first of a series of short leaflets targeted for the general public on the effective use of computers by home users and end users. The production of this leaflet (Appendix B) was led by two of the authors, Bob Crooks and Margaret Ross. It also made proposals for a new range of qualifications for end users and professionals to be provided by the BCS. These qualifications are targeted at the whole span of computer users and professionals, from those in top management to those working directly with the equipment, programming, teachers or those using computers for social or personal interests, members at many of these levels have been involved in their development

A series of seminars have been held targeting senior IT management within the charity sector, within the academia sector and from major organisations including local and national Government. In addition to these, various meetings have been held in conjunction with local Branches of the BCS, to raise awareness of issues ranging from the EU Code of Conduct for Data Centres to the safe disposal of computing equipment.

Since 2006, a green theme has been one of the aspects of the BCS Quality Specialist Group's annual international Software Quality Management conferences, targeted at industry, and also the group's annual international INSPIRE conferences, aimed at

academia and trainers. These conferences have been held in Southampton, or Stafford, and Belfast as well as in Finland. Papers relating to these activities have also been presented at other conferences.

3. Data Centre Specialist Group

This active BCS Specialist Group, with over 800 members, is aimed particularly at those involved in building, operating, supplying or providing consultancy to Data Centres, in addition to those responsible for managing them. It has a very active website, in addition to organising regular meetings to facilitate the discussion of issues and exchange of good practice. This group has also developed software to allow simulation analysis of the data centre reporting both cost and energy impacts of the selected actions to work both as an educational tool and business case support.

One of the authors, Liam Newcombe, Secretary of the BCS Data Centre Specialist Group, represented the BCS in the cross European development of the EU Code of Conduct for Data Centres [7,8]. This provides a basis for over one hundred best practices for operating data centres and building new facilities, each of which is given a score out of five to identify the potential cost and energy savings from implementing the appropriate practice in an organisation. It also provides a standard vocabulary to clarify the definition of such terms as "direct air free cooling" which could be known in the UK as "fresh air cooling" or in the United States as "direct air-side economizer".

Two of the authors, Zahl Limbuwala, Chair of the BCS Data Centre and Liam Newcombe have been part of the small team developing a syllabus and ISEB qualification to build knowledge and skills around Green data centres.

4. Green IT Specialist Group

The BCS Green Specialist Group was launched in January 2009, in order to promote green computing, address green issues and the adoption of green practices for Information and Communication technologies and services across their lifecycle. This was seen to be of particular relevance to end users of computing equipment, SMEs, academics, teachers, the wider public and all those interested in promoting the sustainable use of computing, ranging from reductions in the use of power and its associated Carbon emissions, to the use of non-sustainable sources for materials used in manufacture.

The group aims to provide a focus for BCS Members concerned with the adoption of green ICT practices and in promoting their sustainable and effective use.

In order to achieve this, the group plans to:

- Raise awareness and knowledge of the issues and opportunities related to green issues, through facilitating blogs, web discussions, articles and events.
- Build a repository of guidance on Green ICT issues and working practices, including qualifications, case studies, research and lessons learnt, for organisations, end users, and the general public to use with confidence.
- Promote and build credibility for the BCS as a source of expertise and information to which people and organisations will turn in the field of green issues particularly for end users, schools and academics, for instance through the provision of road maps, policies and guidance.
- Develop and support a knowledge community for end user green issues, amongst academics, industry and government experts.
- Work with the BCS Data Centre Specialist Group and the BCS Carbon Footprint Working Group, to provide co-ordination and a central direction for BCS developments on Green ICT, issues. Develop a programme of events, both standalone and with other BCS Branches, BCS Specialist Groups and other bodies.
- Keep under review, advise and make recommendations to the BCS on strategy for the development and assessment of green ICT issues in order to promote the society's objective of increasing accessibility to information and inclusivity in education.
- Consider partnership requirements to achieve effective and efficient delivery of guidance and best practice for tackling relevant green issues and of qualifications for organisations, the wide public and in education establishments.
- Consider quality assurance requirements of green courses and assessments and to promote best practice in all aspects of greening issues relevant to users of computers
- Promote high quality practices and research relating to relevant green IT issues.

The BCS Green IT Specialist Group has already organised various meetings, established a Website site, blog and is in the process of producing videos streams from its meetings that can then be accessed by BCS members worldwide.

5. Green IT Qualifications

5.1 The Green ICT Foundation Diploma

Four members of the BCS Green IT Specialist Group committee have been active for over a year, as part of the team developing the ISEB Certificate and Diploma qualifications in Green IT.

The basis of these qualifications was a Greening model (Appendix A) developed by two of the authors, Margaret Ross and Geoff Staples, and presented as part of a greening paper [9,10], and further work from Bob Crooks to provide a grid of Green IT knowledge to provide a structure for course material. This was then enhanced following discussions with quality professionals who had several years' experience with the Capability Maturity Model Integration (CMMI), which is a process improvement approach that provides organizations with the essential elements of effective processes, and other quality methods and models. This work formed the basis of the proposal to the BCS for the GreenIT qualifications [11]. This addresses the need for a low-cost, easily accessible means of assessing and assuring the minimum knowledge relating to greening computing, which could be required by one or more representatives from a Small or Medium Enterprise (SME).

There is a greater awareness of greening issues, particularly relating to computing. There is evidence from various surveys (which have been widely reported) where senior management have raised green issues as a major concern at Board level, particularly for large organisations. The benefits of addressing the greening issues have been clearly identified, relating to the reputation of the organisation, as well as preparation for potential new UK and EU regulations and directives eg the forthcoming UK Carbon reduction Commitment (CRC) regulations, and to minimise cost and risk of non-sustainable practices affecting shareholder value. In particular there is awareness that data centres of large organisations have been responsible for substantial power costs and inefficient energy use.

The BCS believes that small businesses could benefit by having at least one employee equipped with a Diploma to enhance their green credentials and deliver potential financial savings, and improvements to their reputation and credibility for sustainability with their employees, the wider public and their current and potential customers.

The Business Case for SMEs is based on four major benefits –

1. the customer pressure to be able to justify and prove their carbon footprint and green credentials
2. the ability to reduce carbon footprint and also costs by careful choice of purchases and practices
3. the reduced cost from savings on power, time and transport
4. the enhanced reputation of the SME.

This move towards green computing for SMEs is motivated by pressure from larger organisations, who wish to be able to confirm that their suppliers and sub-contractors are also adopting green computing practices. The need to credibly address greening issues has now become one of the top priorities for major organisations and as part of their policies. Pressure from these organisations will be placed on SMEs to be able to

prove their commitment to the green issues, hence the need for SMEs to seriously consider Greening within their own business.

So there is a need for a “green-knowledgeable computing person” in every SME, and possibly in each department within larger organisations, to be able to prove a basic understanding of the relevant issues. This would be in addition, for the larger organisations, to the greening expert authority.
Currently, all businesses, whether large or small, normally would have at least one member of staff responsible for data protection (where there is a similar structure of top level authority and “in business” experts), and hopefully at least one responsible for quality. In SMEs, these roles might be just one part of one named person’s job, but there would be at least one named individual. This scheme provides the opportunity for SME’s to set up a similar role for a person to provide expertise on green IT within the business department or SME. This would be of direct benefit to the business, and to the wider population.

The proposed ISEB Foundation qualification exam will be available as a fully automated qualification based around a syllabus and about forty question multi-choice assessment, which will be delivered online.

The syllabus content will be based on topic areas such as power issues, the purchase of equipment, the disposal of equipment, staff awareness and procedures, and legal requirements.

The syllabus for this, together with suitable reference websites and sample questions, will be provided so that those wishing to take this Foundation qualification could attend a suitable course to prepare for the assessment.
A course to support this qualification is currently being developed by the BCS and the training provider QA, that will provide a basic education in environmentally friendly computing, which should be available by Summer 2009.

5.2 A Data Centre Diploma
This will be aimed at those people that select or manage software, IT, mechanical and electrical equipment, in addition to those that procure or offer data centre space or services [7,8].

Following a three-day Practitioner course there will be a one day ISEB Diploma examination. The syllabus is based on understanding and implementing the EU Code of Conduct and allows candidates to understand the best practices, why they were selected and how to apply them together with the ability to understand how to implement the Code and the potential benefit of each practice. The roles of both participants and endorsers of the Code will be considered, in addition to understanding how to complete the appropriate applications to participate. It will also cover

performing an internal audit in order to determine the compliance to the Code, indicating the potential cost in time and resources, the benefits of compliance and how to identify remedial actions. Finally attendees will be shown how to complete the application and data gathering forms for Code of Conduct participant status. This qualification is due to be available in the summer of 2009.

5.3 Proposals for a Green IT Practitioner Qualification

A further qualification could be introduced at a practitioner level, designed again for the SMEs [11,12,13]. Following successful completion of the foundation level assessment, a further in-depth assessment could be undertaken. This could require possibly a short course or blended learning to prepare the candidates to be able to demonstrate their detailed knowledge, applied to their own organisation. This could involve the candidate undertaking an assessment of the "green-ness" of their SME or department. This could be presented as part of a report that could also indicate potential improvements, the metrics to measure the effectiveness of these, potential problems in undertaking these improvements, ways to minimise these problems and the Business Case to implement the proposed improvements. The potential syllabus for the Foundation and Practitioner assessments could align to the model based on five levels [Appendix A], similar to that of CMMI. The Foundation level would be based mainly on level 2 , while the Practitioner level would, in addition, address the issues of level 3 and 4 of the Greening Model.

The benefit of such an assessment for the individual would be the ability to demonstrate that the appropriate knowledge could be applied effectively. In addition, there would be a direct and immediate benefit to the SME or the candidate's department, as they would have a proposed "road-map" that could be considered and possibly followed, to improve the sustainability of their computing practices and subsequently improved their reputation as socially responsible computing users. If a candidate was not able to undertake the audit of their own SME or department, then possibly arrangements might be made with another SME or a local school or charity.

The assessment of this practitioners' qualification could be undertaken by relevant training centres or local universities or colleges, that had the appropriate quality system in place to ensure relevant checking and level of assessment had been reached, including a possible site visit to the SME or department and interviews with the candidate. Again, opportunities exist by using appropriate technology so that this might be undertaken remotely with arrangements for local visits by recognised responsible persons.

7. Conclusion

The European Union's "Clean Tech" [4] was proposed in 2009 "to promote the mobilisation of technologists which enable both businesses and individuals to perform everyday activities in a more energy efficient way in order to ensure the advancement of targeted reductions by 2020 ie saving 20% of primary energy consumption, reducing greenhouse emissions by 20% and raising the share of renewable energy to 20%". The European Union countries should "create transparency and common ways of measuring energy performance" which means that the IT sector will need to set targets and reach a collective agreement on how energy performance should be measured. In addition various energy using sectors will be encouraged to work with the computing industry to identify potential areas in which computing could improve efficiency and reduce emissions, in addition to providing suitable computing tools that are likely to lead to these savings.

This pressure on the European governments, will result on similar pressure being put on organisations of all sizes including on individuals. With the relevant pressure on socially responsible computing, the green issue needs to be considered by all organisations, whether driven by the Business Case, pressure from higher up the supply chain, by customers or for reputation management. These proposed individual qualifications , will provide a tangible benefit to UK businesses and employees. By proposing qualifications that could be undertaken at almost any location, within the UK or worldwide, at little financial cost, particularly at the foundation level, the BCS aims to raise the awareness and improve the implementation of green practices and procedures amongst its membership and beyond.

8. References

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Appendix A

The basic Greening Model was as followed:

Level 2
Recycling paper and cartridges
Sign indicating switching off of lights/machines
Timing out of machines
Double-glazed windows
Use of recycling of output (paper etc)
Arranging time/shifts/meetings to encourage car-sharing/alternative travel arrangements
Encouraged teleworking where appropriate, understand the need for advice and training, and be aware of the possible negative greening aspects
Monitor final disposal of equipment
Understand the basic measurement of carbon footprint
Measure the use of electricity etc

Level 3
Purchase of recycled paper
Designed Data centres for changing from air cooling to water cooling (building with suitable plumbing and floor strength)
Online conference facilities to reduce travel
Taking account of greening issues when purchasing goods (manufacturing, running and disposal)
Company cars chosen with greening considerations (energy efficiency, increased time before replacement etc)
Consider location (transportation of components etc) and method of manufacture of goods
Consider if updates necessary (requiring full replacement or only parts)
Require to see greening of suppliers/outsourcers, including the final outsourcers
Collection and monitor relevant data, identifying trends (power usage etc)

Level 4
Heat to be re-used for the building
Water cooling of servers
Check carbon footprint on staff travel
Consider energy efficiency and carbon footprint in the manufacturing of equipment
Consider energy efficiency and carbon footprint in the delivery of equipment
Consider energy efficiency and carbon footprint in the running of equipment
Consider the distance for the delivery of spare parts and servicing of equipment
Free advice/help on greening of teleworkers' homes,
Monitor policy for greening and recycling by suppliers

Monitor policy full greening and recycling by outsourcers including their final outsourcers
Check and require proof of the implementation of the policies for primary and secondary suppliers
Check and require proof of the implementation of the policies for outsourcers and their suppliers and supply chain
Maintain quantitative data records
Maintain an Action Plan for greening improvement

Level 5
Generate own power (solar power, wind turbines etc)
Use surplus heat outside the organisation
Free advice/help on greening of employees' homes
Free advice and help on greening issues to suppliers
Free advice on greening issues to customers
Action Plan to be regularly reviewed and updated
Constantly looking for methods to improve greening within the organisation and beyond.

It was further decided that the following should be considered:

- Each level should comprise of core and non-compulsory activities, so taking account of the size and sector of the appropriate SME or organisation
- The assessment of all stages should also be a backward compatible, so ensuring that the greenness identified at the lower levels was still maintained
- The target level for each activity needs to be identified, but must be adjusted to take account of new developments
- Recommendations for methods to collect and analyse the data for the relevant activities at each level should be addressed
- The use of carbon credits should be included
- Basic questions of the yes/no type, of say between 30 and 100, should be provided which could be used as a basic tool for identification of level
- Key Practices must be developed

This Greening Model would not be appropriate to all organisations and some would feel that the Key Practices should be altered between levels, and additional practices included for their particular environment.

The model has been further developed into a grid of Green practices and knowledge that now forms the basis for the syllabus.

Appendix B

Greening your IT Work space

Today the need to reduce greenhouse gasses and consumption of power is widely accepted. Information and Communication Technologies (ICTs) are an increasingly important contributor to Carbon emissions in the UK and with the growing business and domestic use of ICT, its footprint now exceeds that for the UK aircraft industry

With UK public sector, at £12bn (2007/08), having the largest ICT budget, UK Departments and Local Authorities are embarking on aggressive plans to reduce their ICT footprints. These public sector commitments will put pressures on all its suppliers to use and provide greener IT assets and services, and along with those from UK international commitments, will eventually ripple through to all of us

Why take action now? Advantages of Green IT include

- Enhanced Reputation (Green image)
- Feel Good factor (making a difference, saving the polar bears)
- Reduce energy bills (Carbon comes from energy and energy costs money)
- Reduce future energy requirements by purchasing green assets, services and consumables
- Use ICT to facilitate working from home, and reduce the cost of travel, remote meetings

The journey to effective Greening

- Raise awareness at all levels.
- Assess Green impact of your technologies, practices and behaviours, identify hot spots, establish baselines and identify simple things to do first
- Establish a Senior Manager as a Green "champion".
- Engage all staff to win hearts and minds
- Corral the problem - adopt green criteria and accounting for new investments

Staff awareness – examples, from the Carbon Trust, include:

- A computer left on 24/7 will cost about £37 a year, whereas by switching off at night and weekends, the charge can be reduced to about £10 a year - enough energy to make some 34,900 cups of coffee
- A PC monitor switched off overnight saves enough energy to microwave six dinners
- Turning off all non essential equipment in an office for one night will save enough energy to run a small car for **100 miles**
- Monitors account for almost two-thirds of a computer's energy use
- Office equipment is the fastest-growing area, accounting for up to 20% of total UK energy use.

Assess technologies and behaviours – take simple actions first

⇨ **Reduce daily consumption turn it down or switch it off!**

- Awareness sessions and posters to staff to switch off the lights when not required;
- Lights to automatically switch off when no movement within the room;
- Switching off computers, when not required, either by the users or automatically;
- Reduce brightness on monitors

⇨ **Consume less with what you have**

- Remove active screensavers – same power used to run a screen saver as in working
- Reduce screen brightness and increase contrast
- If monitors and printers have standby settings use them!
- Where available enable active power management on PCs and Laptops
- Apply timer switches to non-networked technology and printers
- Share PCs and hot-desk
- Rethink Data Storage Policies to reduce servers
- Encourage users to remove unwanted files, eg allocate ½ day every 3 months

⇨ **Take less from the environment**

- Share printers and other devices eg comms devices, faxes, servers
- Activate shared printer at the device
- Use recycled paper and recycled print cartridges and re-cycle again!
- Ask yourself – Why print? If you have to
  - Set printers for double-sided or side by side printing as the default
  - Set printers for draft and grey printing
  - Adopt high density fonts and maximise print areas

⇨ **Use IT to reduce carbon from other services/ activities/overheads out of peak times** eg Office space

- Utilise the concept of "hot rooming" to reduce the heating and lighting to a limited area
- Improve the physical security so staff feel able to start and work earlier/later, to reduce space required to house everyone
- Use teleconferencing and video-conferencing to save travel and meeting room space

Build your Green ICT Champion

Gear up your IT Manager/person to...

- Understand best practice from journals, latest reports, many freely available from the Internet,

- Do the obvious things now, eg buy greener kit at next refresh eg Energy Star rated
- Get others to be aware of how to use IT to work and do business in greener ways.

Engage Staff - win hearts and minds

- A Survey by Logicalis indicated that 85% of employees switch off their home PC when they have finished with it, whereas only 66% turn off work machines after use
- Provide monthly visualisations of consumptions eg toner and paper carton mountains
- Set up a staff group to come up with their ideas
- Provide metrics and monitoring to show and encourage progress and if possible harmless competition with rewards!

Procurement – take less, use more

- Why procure, why not re-use or re-cycle
- Upgrade rather than purchase new equipment
- Check "Green" rating of all purchases and get information on manufacture and transportation;
- Invest to save (eat less, exercise more!):
    - buy video and tele-conferencing services to save travel;
    - buy laptops to enable staff mobility – but safeguard data
    - buy multi-function and shareable devices
    - future proof - buy modularised, upgradeable devices
- Assess investments in terms of energy consumption as well as business value
- Specify low-power consumption CPUs and high-efficiency Power Supply Units (80% or better)
- Choose goods made from partial or wholly recycled products/materials;
- Require information from suppliers on the "greeness" of their products and services including transportation
- Rethink Just-In-Time policies to reduce transportation
- And remember if you have to dispose of kit – do so carefully!

Remember …

- Best practice evolving at a fast pace, need to invest in keeping up to date
- Given energy price issues and ability to use IT as a tool to effect gains elsewhere the business case can be now be made for Green IT.
- There are some things you can and should do now
- Pressure in the supply chain from greener government practices and demands
- Many global organisations are making demonstration of green / energy efficiency a requirement for identifying suppliers / products.
- Cannot afford to be left behind!