Institute of Science Technology

The Journal

Spring 2007

The Official Journal of The Institute of Science Technology -
The Professional Body for Specialist, Technical and Managerial Staff

Reverse of cover page.

The **Journal**

The Official Publication of the Institute of Science Technology

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Spring 2007




Editorial

Ian Gray

Satisfaction

"Earth provides enough to satisfy every man's need, but not enough for everyman's greed" Ghandi once said.

"We live in a reign of quantity and materialism, which is inherent in modern technology. Goods and profit are the prime motivation, people are an afterthought, and the social consequences are paid for with money. Present day technology is too big, complex and violent, and as a result is incompatible with human nature, the rest of living matter and resource endowment. An attitude to life which seeks fulfilment in the single-minded pursuit of wealth - in short materialism - does not fit into this world because it contains not within itself no living principle, while the environment in which it is placed is strictly limited."

"The problems already apparent in the environment are not the consequences of incidental failure, but of technological success. Technology should be simple, so we are not too specialised to be wise or non-violent, so we are working with nature instead of against; and smaller on a human scale. Small scale operations, no matter how numerous, are always less likely to be harmful to the natural environment than the large scale ones, simply because their individual force is small in relation to the recuperative forces of nature and people require a relationship with nature that guarantees."

I have taken this from a 1973 publication to demonstrate how far man seems to have not taken heed of the consequences of infinite growth to the point where the consensus is now that "enough may well be enough".

I have included a feature on energy saving and hope to follow this up with a series linked to how we can all make a difference in our chosen profession. Fortunately, people have stopped saying you cannot make a difference because all the signs are that you can, even to the heavily quoted "turn off your electronic equipment at the switch and not via the remote, when not in use"!

I recommend our vibrant web pages (www.istonline.org.uk) as there is a strong movement to help you understand how you can fit into society and how the IST can support your career aspirations. If you continue to perform your duties in a professional manner, and keep up with new developments in training, your peers will listen and take heed of your advice, which will give you the greater satisfaction.

Be dynamic as you can change the world!!!

Energy Saving – the facts

Dave Collier

How much is energy inefficiency costing you?

The potential for energy savings in process and automation is significant, with 10 million motors used in the UK, consuming £4bn worth of electricity a year. Typically, from an industrial site with an electricity bill of £150,000 pa, on average £100,000 will be used on running motors. Any reductions to the electricity used will not only have a significant impact in the reduction of global warming, help meet legislation but can give significant cost benefits for the business as a whole.

Creating a climate for change

The UK government has long been focussed on creating a climate for change in both business and domestic consumption of energy. Following the launch of the Kyoto Accord, the UK established the Climate Change Programme, which has the target of reducing carbon emissions by 20% by 2010. This programme saw the introduction of the Climate Change Levy (CCL) – a tax of 10 to 15% on all energy supplied to industrial and commercial users. By reducing energy consumption, companies will minimise the impact of this tax.

Allowances for improvements

At the same time, the Government introduced the Enhanced Capital Allowance (ECA) scheme. This enables businesses to offset the impact of the CCL through investing in energy efficient products and technologies, and permitting the full cost of the investment to be relieved for tax purposes against the taxable income of the period of the investment.

The ECAs are given at 100% of expenditure in the first year. This means that the whole of qualifying investment can be set against tax for the year in which the equipment was purchased, rather than writing the equipment off over a number of years. Depending on your tax rate it will, in most cases, cut the cost by 6 or 7%.

Qualifying products and technologies for ECAs are registered on the Energy Technology List (ETL), managed by the Carbon Trust. The ETL include products and technologies such as motors and variable speed drives, and power meters used as part of an automatic metering and targeting system.

Energy in buildings

The new Approved Document L2 of the Building Regulations covers the conservation of fuel and power in buildings other than dwellings, which came into force on the 1st April 2002. At least 90% of the annual energy consumption should be accounted for either by calculation or by actual measurement. Energy meters provide an ideal solution to metering the consumption of energy.

For buildings with floor space of over 1000m2 automatic metering reading and data collection is called for, networked power meters connected to a central data collection point can provide ideal solutions. Where there is a high-energy use it is recommended that these should be sub-metered separately, these include the following categories.

Plant type	Rated input power
Boiler installations	50kW
Chiller installations	20kW
Electric humidifiers	10kW
Motor control centres feeding fans & pumps	10kW
Final electrical distribution boards	50kW

Increasing energy prices

As far-reaching as the legislation is, perhaps the biggest impact on business is the steep rise in the cost of energy. Between Feb 2005 and Feb 2006, there was an increase of around 74% on the cost of wholesale electricity and gas. This poses a big problem for businesses as their profit margins are squeezed and they are faced with the dilemma of whether to take the cut on their bottom line, or to pass the cost increase through to the prices of their products and services and therefore risk becoming uncompetitive.

Impact of savings

Unless energy efficiency has recently been thoroughly addressed within your organisation there are likely to be energy savings of between 10 and 20% readily achievable. Energy efficiency can be vital to the profitability of any company, as cost savings go straight to the bottom line making the business more competitive, and can safeguard profits and employment.

For example: a company with a turnover of £1,000,000 and £100,000 annual gross profit or a 10% gross profit margin. If their energy cost is £40,000 pa, by achieving energy savings of 20% this represents a saving of £8,000. As an impact on the profit this represents an increase of 8%. To achieve this by increasing sales would mean finding an additional £80,000 worth of sales.

4 STEP ENERGY SAVING PLAN

A planned approach can help you to understand your electricity consumption and discover what you could save. Begin where the biggest savings can be made first. Here is a simple 4-step plan to start you off…

1. **Review your processes -** Determine where energy can be saved
2. **Collect and analyse data -** Measure energy consumed
3. **Recommendation and implementation -** Install equipment or modify processes
4. **Review -** Review energy use regularly and maintain your equipment to keep on saving

Measure your Energy

Measuring energy is often seen as a difficult, expensive exercise that has little or no bearing on practical production. However, as the old adage says: If it cannot be measured it cannot be controlled. By knowing where, when, why and how much energy being used you can determine the steps to reduce the consumption. The recommendation from the legislation means that even plants with small loads should be measured.

VSDs save energy

Traditional means of controlling liquid/gas/air flow involves running the pump or fan at constant speed and using dampers, vanes or valves to vary flow. This is like driving your car with your foot pressed to the metal on the accelerator and using the brakes to vary speed – wasteful of fuel coupled with an attendant wear and tear on the system.

With 72% of electricity consumption going to turn motors in processes and building utilities, and 63% of this energy used to circulate fluids/air, reducing energy in these situations can result in large savings. Variable speed drives (VSDs) on fans and pumps can be used to control flow by directly controlling the motor. Running a fan or pump 20% slower using a VSD will give you a 50% saving in electricity use, thanks to the fan/pump square law.

Motor Management Policy

It is startling to realise that an 11kW motor costing about £700 can consume over £50,000 worth of electricity over a 10-year operating life. An efficient motor management policy is far more important to the bottom line than the purchase price.

The most practical time to replace a motor is when it fails. As a rule of thumb small motors and motors with long running hours should be replaced. Large 3 phase motors, specialist motors and motors that only run occasionally can be rewound. Avoid oversized motors, they will run below full load or inefficiently and cost more to run.

Compressed air is not free

Compressed air is an essential resource and is sometimes referred to as the fourth utility. The common misconception is that it is free! Air is free - until it is compressed, then it becomes about 10 times more expensive than electricity. Simple steps to manage pneumatic systems can have significant savings;

- Keep your Airlines Clean - clogged airlines reduce flow rates and make the compressor run for unnecessarily long periods.
- Check controls - compressors left running when air is not needed wastes energy
- Reduce pressure - operate the compressor & system at the lowest possible acceptable pressure.
- Reduce leaks - a recent survey found that average leakage in industrial plants was 39 per cent of total demand

Energy saving makes sense

Energy saving and efficiency is not just about meeting the legislation and being “green”, but can put profit back on the bottom line, even a few simple steps can make a difference. The first rule of energy saving is "if it isn’t being used, switch it off". Regular maintenance can also make a difference, by maintaining your motors drives, belts, couplings and moving parts, checking filters, inlet ports, fan blades regularly you can ensure they are running at optimum efficiency. Simple steps are usually the most effective.

The IST is grateful to RS (Radio Spares) for permission to reprint this Dave Collier (RS staff member) article especially as energy saving is becoming a vital financial tool for the future.

For more information and links to energy saving resources visit http://rswww.com/automation

Selection of Laboratory Disinfectants (continued)

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Detergents

Types of detergent

There are various types of detergents, each with different modes of cleansing action. This section does not examine the range of available detergents in detail. In addition to cleaning properties some detergents have additional anti-microbial properties due to their ionic nature (either anionic or cationic). Some examples of commonly used detergents are:

a) Soaps

Soaps are soluble or insoluble products of natural fats to which an alkali is added, such as, sodium or potassium.

b) Anionic detergents

Anionic detergents are the most commonly used in industry. They are generally soluble, foam producing emulsifiers. Undue levels of foaming is often a problem which restricts their use in clean rooms.

c) Cationic detergents

Cationic detergents are little used in the pharmaceutical industry due to incompatibility with the pH of commonly used disinfectants.

d) Non-ionic detergents

Non-ionic detergents are used when pH is an important factor for sensitive surfaces.

e) Amphoteric detergents

Amphoteric detergents have the properties of both anionics and cationics, and often have some bactericidal properties.

f) Alkali detergents

Chemical detergents of an alkali nature, such as sodium hydroxide (caustic), have some bactericidial properties. They can readily dissolve organic matter like protein.

g) Acidic detergents

Chemicals of an acidic nature often include oxidants and have some bactericidal properties. They can work against organic and inorganic matter.

Additional chemicals are often added to detergents to enhance their performance. Such additives include surfactants, which act to disperse fat and to produce uniform wetting, and sequestrents, which act against hard water and scaling. An assessment of compatibility between disinfectants and detergents must consider these chemical additives in relation to efficacy. For example, QACs are inactivated by anionic surfactants[i].

Selection of disinfectants

A number of factors require consideration in order to select a disinfectant. These can be grouped into three areas: chemical properties (which have been discussed above); and factors relating to the performance of the chemical agent. These differing factors are discussed below. In the discussion it should be noted that the effectiveness of a disinfectant is related a complex interaction between all the factors . In addition, certain regulatory or health and safety standards may apply to particular laboratories. The reader should consider these as appropriate.

Among the most important factors for consideration are[iii]:

i) Concentration
ii) Time
iii) Number, type and location of micro-organisms
iv) Temperature and pH
v) Amount of organic and other interfering substances

Each one of these factors is examined in turn.

i) Concentration

Disinfectants are manufactured or validated to be most efficacious at a set concentration range. The setting of this concentration range involves ascertaining the minimum inhibitory concentration (MIC). The MIC is the lowest concentration of the disinfectant that is shown to be bacteriostatic or bacteriocidal. The MIC is measured through kinetic studies of the dilution coefficient. Kinetic studies demonstrate the effect of a change in concentration against cell death rate over time. The higher a disinfectant's concentration exponent, the longer it will take to kill cells. For example, if a disinfectant with a set concentration exponent was diluted by a factor of 2, the time taken for it to kill cells comparatively would double[iv].

ii) Time

Time is an important factor in the application of disinfectants for two reasons: in relation to the contact time of the disinfectant and the expiry time of the disinfectant solution. Contact time is the time taken for the disinfectant to bind to the micro-organism, traverse the cell wall and to reach the specific target site for the disinfectants particular mode of action. Contact time is expressed generally for each disinfectant type at its optimal concentration range. The killing affect, for a constant concentration of a disinfectant, increases over time until the optimal contact time is established. in practical situations however many variables enter the equation like the type, concentration and volume of the disinfectant; the nature of the micro-organisms; the amount and kind of material present and likely to interfere; and the temperature of the disinfectant and the surface it is applied to[x].

Another aspect relating to time is the deterioration of a disinfectant solution over time. Therefore an expiry time limit for the disinfectant solution should be established through chemical testing. As a rule fresh solutions of a disinfectant should be used for each application.

iii) Number, type and location of micro-organisms

Different species of micro-organisms vary in their resistance to different disinfectants. These can be affected by: the numbers of micro-organisms present, their species and the community with which they are bound to.

a) Number

An anti-microbial agent, like a disinfectant, is considerably more effective against a low number of micro-organisms than a higher number or a population with a greater cell density. Similarly a disinfectant is more effective against a pure population than mixed grouping of micro-organisms. A routine disinfectant procedure will be unlikely to kill all micro-organisms present and a number will remain viable. Whether the surviving micro-organisms multiply in sufficient number is dependent upon the condition in which the surviving population remains, the available nutrients and the time between repeat applications of the disinfectant[xv].

b) Type of micro-organism and resistance

Different types of micro-organism have varying levels of resistance to broad spectrum disinfectants as Figure 1 shows. The increased resistance shown is primarily due to the cell membrane composition or type of protein coat.

Figure 1: Sensitivity of different micro-organisms to broad spectrum disinfectants

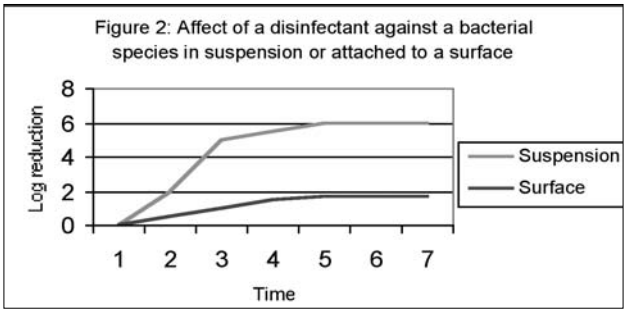
Most resistant	Prions / TSE's
	▼
	Coccidia
	▼
	Bacterial Endospores
	▼
	Mycobacteria
	▼
	Yeast-like / mold-like fungi
	▼
	Gram negative bacteria
	▼
Least resistant	Gram positive bacteria

The hierarchy of micro-organisms in figure 1 are placed in order of resistance. Resistance is either due to the natural genetic properties of the micro-organisms (intrinsic [v vi]), as shown in figure 1, or it is acquired through phenotypic or genotypic variations (similar to anti-biotic resistance through the over-use of one type of disinfectant). Generally innate sensitivity results in Gram-negative bacteria being more resistant to disinfectant applications than Gram-positive bacteria. The reason for the greater resistance amongst the Gram-negative bacteria is due to the greater abundance of lipopolysaccharide (LPS) which is of a hydrophobic nature whereas the Gram-positive membrane is primarily made up of inelastic 'murein sacculi'. In turn, for bacteria, endospores ('spores') are the most resistant because of the relative impermeability of the polypeptides which make up the spore coat to hydrophilic agents.

c) Location of micro-organism

The location of micro-organisms influences the effectiveness of disinfectant treatment. Micro-organisms in suspension are easier to kill than those affixed to surfaces. This is due to the mechanisms of micro-organism attachment, such as bacteria fixing themselves using fimbriae or when a biofilm community develops. Such positioning impact upon the contact time required for the disinfectant to bind to the micro-organism, cross the cell wall and act at the required site. Figure 2 illustrates the greater log kill achieved over time for bacteria in suspension compared to bacteria fixed to a surface.

iv) Temperature and pH



Each disinfectant has an optimal pH and temperature at which it is most effective. If the temperature or pH are outside this optimal range then the rate of reaction (log kill over time) is affected.

Generally temperature influences the rate of reaction. Most disinfectants are more effective and kill a population faster at higher temperatures although many disinfectants, due to practical considerations, are manufactured to be used at ambient. Some disinfectants, particularly oxidising agents like peracetic acid which has an optimal temperature of 40 - 50°C, and sporicidal agents like ortho-phthaladehyde are more effective at temperatures elevated above ambient. Disinfectants which are sensitive to temperatures other than at ambient are normally assessed through the use of a temperature coefficient, or Q_{10} (which relates the increase in activity to a 10°C rise in temperature)[viii].

The effect of pH is important because it influences the ionic binding of a disinfectant to a bacterial cell wall thereby ensuring disinfectant molecules bind to a high number of micro-organisms. Many disinfectants are more stable at a set pH range, for example, acid based disinfectants can become less potent in alkaline conditions whereas a gluetaldehyde is more potent at a basic pH. The use of a disinfectant outside of its desired pH range results in reduced efficacy.

v) Interfering substances

The presence of different substances on the surface or in the equipment requiring disinfection can affect the efficacy of the disinfectant in a variety of ways ranging from increasing the contact time to complete inactivation. In order for a disinfectant to be effective it must come into contact with the microbial cell and be absorbed into it. If substances, such as oil, dirt, paper or grease, act as a spatial barrier between the microbial cell and the disinfectant the efficacy of the disinfectant will be adversely affected. The presence of such substances ('soil') halts disinfectant efficacy by either reacting with the disinfectant or creating a barrier for the disinfectant. This effect is increased if the surface itself has defects and crevices which limit disinfectant penetration[ix].

Summary

This article has, in the context of the general laboratory, examined different types of disinfectants and detergents and considered factors for disinfectant selection. Of the areas discussed the selection of a disinfectant is perhaps the most complex decision for there is no ideal disinfectant with even the most potent disinfectants limited by so many variables from resistance in the microbial populations to inhibitory substances, like presence of organic matter, to the environment itself.

No matter how careful a scientific selection and thorough a validation, if the disinfectant (and companion detergent) is not used consistently and carefully then it will not be effective. In developing a protocol and SOPs for application, the laboratory faces further difficult choices from difficulties in compatibility; the need for rotation; cost and safety considerations. In short, the use of disinfectants and detergents for the laboratory is complex and the laboratory manager or supervisor must tread along a path divided between scientific properties, practical considerations and safety considerations.

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The Warm-Blooded GroDome Challenges The Cold-Blooded Glasshouse & Beyond

Keith Hamp

Botanical research in the twenty-first century is endeavouring to resolve critical issues, which affect all our lives. An increasing population with diminishing resources and a predicted climate change is increasing the demand on the scientific community to find environmentally sustainable solutions to the production of food, pharmaceuticals and biofuels. In order to complete this mission the plant sciences community must have the correct tools at its disposal.

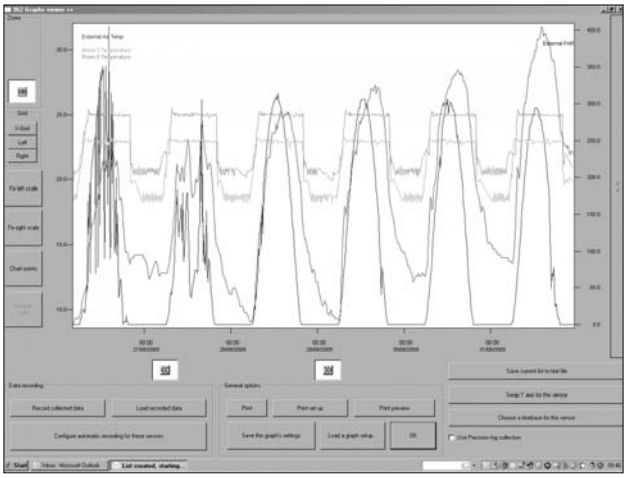
The principal tool for any botanical research is the greenhouse, with its ability to maintain a uniform temperature that is not influenced by external climate. However, when containment, all-year operation, security, reliability, capability to replicate exact research conditions, data storage, environmental considerations and economic running costs are added to this prerequisite we are demanding a major engineering solution, which is a far cry from the traditional twentieth-century greenhouse.

It is no longer practical to hinder important research with the restrictions of seasonal constraints or risk the loss of valuable research as a result of mechanical breakdown. The solution to these issues is the GroDome, a greenhouse designed as a tool to aid research rather than a protected area where botanical research is accommodated.

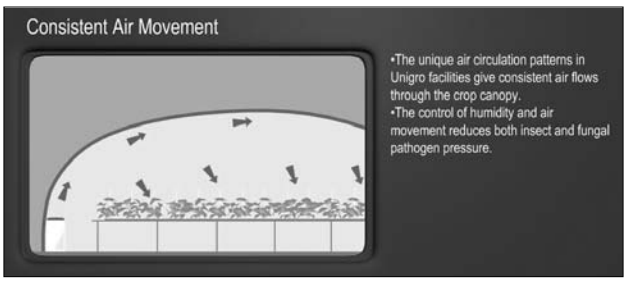
The GroDome is a completely sealed facility constructed from shatterproof polycarbonate. The shape of the design enhances natural light transmission reducing solar reflection and provides consistent airflow throughout the research area. The GroDome's qualities could be compared with a warm-blooded animal as the thermoregulation maintains a stable internal body temperature regardless of the external influence of climate conditions. Additionally this is achieved without the necessity for shading or venting to reduce the affects of solar gain, as is the normal practice with a traditional glasshouse or to continue the analogy the "cold-blooded glasshouse".

The key to the high functionality of the GroDome is its building management system [BMS] that governs the unique cooling system and logs all the conditions within the facility. The BMS monitors the sensors positioned throughout the chambers and instantly activates the system to respond to temperature changes, and enable hydraulic, air-handling and electrical control.

This ensures that the GroDome operates exactly within the predetermined temperature set points and maintains the integrity of the research conditions. The BMS is also designed to initiate remote warnings to designated personnel when malfunctions or mechanical breakdown occurs. Ah equipment failure! Loss of research conditions! Hours of lost research! Not so! The GroDome is designed to maintain its controlled conditions by using its under floor coolth tank which will provide up to 36-hours of uninterrupted environmental conditions, enabling emergency repairs to be completed, even should critical pump or chiller failure occur.

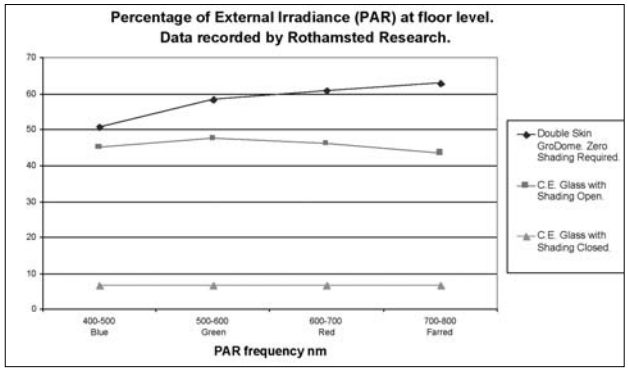


The cooling system designed for the GroDome incorporates a winter and summer strategy which reduces the chiller operational time by using the coolth tank as the supplementary source of cooling. This allows the chiller unit to operate at night when cheaper energy tariffs are available and for smaller chillers to be commissioned. The sealed unit combined with the high insulation qualities of polycarbonate means that the GroDome seldom requires any heating. However, the fancoils within the facility do have a heating capability for locations of extreme winter conditions. In an era of carbon footprints and regulations for the conservation of energy it is essential that the product design caters for these obligations. The GroDome is designed with the capability to include a heat sink where redundant heat from the cooling function can be stored under the facility. This provides a constant supply of useable free heat, which can be transferred to adjacent facilities providing a further reduction in costs and fulfilling a commitment to the environment.



The sealed design of the GroDome ensures that the research being conducted can be carried out under the recommended health and safety containment requirements.

The levels of containment [1-3] with relatively minor adjustments can be confidently maintained. The robust polycarbonate glazing, which is secured to the galvanised steel framework by high performance butyl gaskets, is engineered to withstand high wind levels [up to 120mph] and resist vandalism. The air-handling system is fitted with F8 filters on both intake and extract air ducts and allows pressure differentials of up to 60 pascals to further contain the research areas. All liquid waste from the facility is processed through a bespoke designed microbial deactivation unit which deactivates plant based bacteriological, fungal and viral pathogens that may be used in Containment Level 2-3 research. The procedure is monitored by the BMS and the system processes the liquid waste until it is safe for disposal in to the site drainage system.



The flexibility of the GroDome permits each design to be tailored to the client's requirements to ensure that the finished facility is the correct tool to help solve the problems of the twenty-first century and be worthy of the expertise offered by modern scientific researchers.

Keith Hamp has been with Unigro since 2001 in the position of Commercial Director which involves developing the commercial strategy of the Company and also in this case includes all the Managing Director's roles as he is solely answerable to the Group's Board. Keith is accountancy trained which gives him a clear advantage when dealing with the intricacies of research Hi-tech capital projects.

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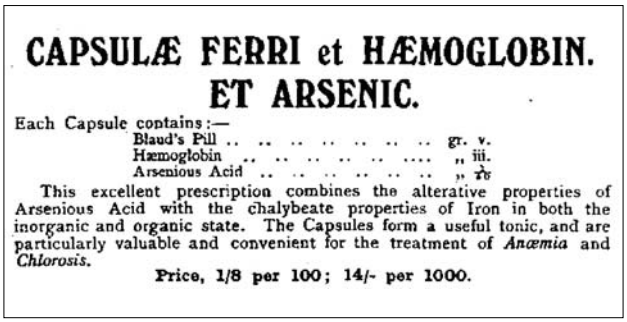
WHAT'S YOUR POISON?

Alan Gall, IST Archivist (alangall@hotmail.com)

The use of arsenic in domestic preparations has a long and interesting history. It once featured prominently in everyday life with applications ranging from cosmetics that damaged blood vessels (favoured by prostitutes for inducing nice rosy cheeks) to cure-all quack medicines. For example, a dilute solution of potassium arsenite was commonly recommended as a tonic. Under the name of Fowler's Solution it sold from the 1780s until almost modern times. Charles Frederick Hyde, a brewer at Chesters Brewery Company in Manchester, noted in his diary for 16th January 1890: 'Went to the city and paid a guinea to Dr.Little for examination and another 6 shillings for specs…no disease whatsoever in the eyes and advised me to continue the use of arsenic for scurvy.' Little did he know that ten years later the toxicity of an arsenic compound would cause much anguish for fellow brewers, and considerably more for their unsuspecting customers.



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Price, 1/8 per 100; 14/- per 1000.

"Arsenic Based Tonic. Advertised by James Woolley & Co Ltd in 1911"

The first hint that something unusual was happening seems to have been noticed sometime after June 1900 by Dr Ernest Septimus Reynolds at the Manchester Workhouse Infirmary. There, a number of patients were admitted with very similar symptoms in varying degrees; paralysis of the limbs, change of skin colour, loss of memory and cirrhosis of the liver. Alarmingly, the number of cases began to increase significantly towards the end of the year. The localities particularly affected were the Manchester districts of Ancoats, Hulme, and Miles Platting; also Ashton Old (and New) Road, and Lower Broughton in Salford. At first the symptoms were puzzling, until Dr Reynolds arrived at the correct conclusion – they were all suffering from arsenic poisoning, and this had come from drinking beer.

Breweries had been promoting the idea that beer, if drunk in moderation, was good for health. 'Beer can kill you' was clearly an undesirable message to be sending out to drinkers, so the Manchester Brewers Central Association quickly commissioned a report by a team of experts. James Niven, Manchester's Officer of Health, also began compiling his own report.

The brewery-sponsored commission reported back on 15th December 1900. Having examined all the basic ingredients used at the local breweries (apart from, apparently, malt) the finger of blame pointed firmly at a manufacturer in Liverpool called Bostock & Company, who had supplied contaminated brewing sugar. During the production of invert sugar they had used an arsenic-containing sulphuric acid bought from John Nicholson & Son, a chemical manufacturer in Leeds. The commissioners were at a loss to explain why Bostocks would use such a product when it should have been obvious than a pure acid was necessary. Incompetence seemed the likely answer as there was no significant commercial gain to be had from buying the slightly cheaper version.

Sulphuric acid can be manufactured either by the lead-chamber process or the contact process. The lead-chamber method was the version exclusively in use by British producers at the time that Nicholson & Son operated. There were four principle sources for the sulphur dioxide required in the process: sulphur, iron pyrites, zinc sulphide and 'spent oxide' from gas works. Arsenic-free acid could be made directly using suitable sulphur (such as that mined in Sicily) but the main raw material used was the more abundant iron pyrites, found in combination with arsenic. The resulting product from Nicholson's works, if sent out un-purified, contained around 2% of the contaminant, measured as arsenious acid. Bostock's chemist failed to recognise that something had changed in the quality of the sulphuric and so it was used to invert sucrose to 'brewer's sugar' with tragic consequences.

There was even some suspicion that Bostocks has allowed the same thing to happen before, perhaps from about 1896, but at contamination levels too low to be obvious.

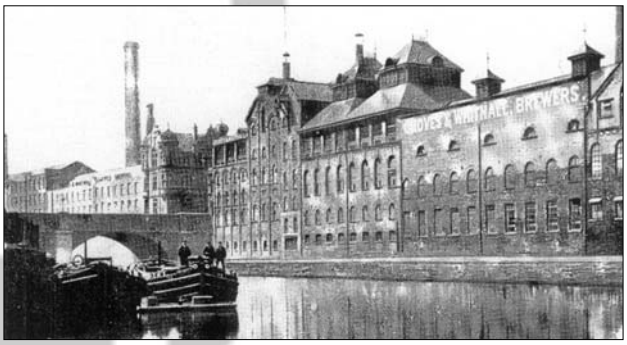
Unable to prosecute the suppliers directly, Manchester Council decided to punished the pub landlords, saying: 'The Sanitary Committee were, moreover, able to secure a number of convictions against retail dealers, which was the only vindication of the law open to us'. The Sale of Food and Drugs Act of 1875 provided the legislation for legal proceedings.

Employees of some breweries (particularly those who made full use of their beer allowance) were particularly at risk. Nearly the whole workforce at one of Manchester's larger concerns showed symptoms of the poisoning.

'For some time the men have been affected by losing alternatively the use of their arms and legs and have shown dropsical tendencies. In one case the sufferer turned the colour of a mulatto, whilst his skin is scaling off.'

Without access to the original information on the origin of the beer samples, it is difficult to say exactly which breweries sold the arsenical beer. Some can be identified from newspaper reports: Richard Seed & Co of Radcliffe, Groves and Whitnall of Salford, Hamer's Brewery of Bromley Cross, North Cheshire Brewery Company of

Macclesfield, Threllfalls of Liverpool and Salford. It is known from a published company history that the Cornbrook Brewery (which stood on Chester Road in Manchester) was also one to suffer. Others were able to boast that they had received a clean bill of health. Boardman's brewery of Ancoats, for one, proclaimed their beers to be arsenic free because they used only malt and hops without any added brewing sugar. Two Ormskirk based brewers sent samples of beer to the West Drayton Laboratories for analysis and their initiative was rewarded with an upsurge in sales when drinkers were assured of a safe product. Clearly, trade would have been badly damaged for those who had used Bostock's sugars and in addition there was the considerable quantity of beer that must have ended up down the drain. Having said that, the local brewers managed to weather the storm. There were approximately 35 breweries in Salford & Manchester at the start of 1900 and two years later it was much the same figure. 1903 saw a few take-overs and closures but other factors may have been involved.



If local legend is true, Brewers Groves & Whitnall dumped contaminated beer into the River Irwell

The effects of the incident were not confined to the south of Lancashire. At Market Drayton one company decided to dump 25000 gallons of beer and in the city of Chester 500 barrels were emptied into the sewers by another firm. In their annual report for 1901 the Burton Brewery Company, whose trading area covered mainly Derbyshire, Staffordshire and Leicestershire, blamed a loss of customer confidence as one factor in declining sales. Alarm even reached London, although the *News of the World* was able to reassure its readers that 'Those who quench their thirst in the City may rest assured that they have a competent guardian in Dr Sedgwick Saunders.' The good doctor had arranged for the local brews to be tested and was quoted as saying: 'The samples we have obtained we shall examine, but in relation to the prospective result it may at once be explained that, for the greater part, City beers are supplied by the better class of brewers.'

The government reacted to public concern by appointing a Royal Commission that sat at the Westminster Palace Hotel in London. All the investigative work had been done by others but the Commissioners dutifully interviewed those 'on the ground' to provide material for their report. It emerged from the testimony of James Niven that at least 2000 cases of poisoning had occurred in his area over the previous six months.

A report by Salford's Medical Officer of Health in 1901 included some observations made by Dr. Reynolds about the effect of arsenic poisoning on the mental state of the victims. 'Thus a totally paralysed patient who has been in bed for weeks when asked if he has not been for a walk this morning will say that he has…and when asked about yesterday will perhaps say with a little prompting that he has been to the seaside.' It would seem that our Dr. Reynolds was not averse to some light entertainment by making improbable suggestions to his deluded patients.

One problem that investigators faced during the early stages of the outbreak was the lack of consensus regarding the best method for accurately determining arsenic concentrations. At professor Delepine's laboratory in Manchester, Reinsch's test was adopted in preference to Marsh's or Fleitmann's, two other methods available before all such techniques were rendered obsolete by modern instrumentation. The Reinsch test involved depositing a film of arsenic on copper foil by boiling the beer with hydrochloric acid. Arsenic crystals were deposited inside a tube by sublimation from the copper foil. A comparison was then made under a microscope with the deposits formed from standard concentrations.

Following the outbreak, there was much talk about legislation to control the ingredients used in brewing. Of course, nothing happened. Dr Reynolds subsequently received recognition as the first person to identify the nature of the poison after writing a detailed paper for the Lancet, published January 19th, 1901. The Chairman of Watney's brewery, Henry Cosmo Bonsor, got to sit on the Royal Commission with such luminaries as Lord Kelvin, Sir W.S.Church, President of the Royal College of Physicians, and the Government Analyst, Professor T.E.Thorpe. The fishes in the River Irwell at Salford were given a supplement to their diet when Groves & Whitnall's brewery reputedly flushed hundreds of gallons of beer into the murky water.

NOTE

I have used the spellings sulphur, sulphide and sulphuric throughout. The current IUPAC recommendation is to use sulfur, sulfide and sulfuric and these forms have now been adopted by the Royal Society of Chemistry. The old spelling seems more appropriate for historical work.

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Thanks are due to Sue Hyde Fielding for the quote from her grandfather's diary and to Tim Ashworth at Salford Local History Library for the picture of Groves & Whitnall.

A Critical Appraisal of Models for Reflecting on Science Technology Teaching Practices

By

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INTRODUCTION

In this article, I intend to review some of the more commonly known and used models for reflecting on professional practice. This is not an exhaustive review but provides a number of models that other practitioners might recognise.

This article is a prelude to a further article and provides some dialogue about the development and application of a reflective model when applied (retrospectively) to my own practice. It also provides for the development of a six stage model that other science technology practitioners might like to apply when reflecting on their own practice.

A REVIEW

A framework for reflection such as that established by Marsick and Watkins (1993) has problems when applied to education where "opening oneself to questions" or "experimenting" may not be acceptable professional practice. Such frameworks, however, offer only one prescription but research is not unambiguous; for it seems that reflection is an activity where there is no single way to the goal (Handal and Lauvas 1987) and many science technology practitioners may use various other models.

Tresman and Edwards (1993) recognize this and do not offer a single prescription but instead illustrate some of the forms reflective practice takes for others. Lewis & Dowling (1992, p27-28) see reflection as looking back and reviewing actions, looking over differences between previous and current events and how relatively well they were coped with. This can occur at the time or afterwards providing situations are re-interpreted and improvements considered.

Similarly Soper (1992) believes that reflection is "...creating space in our heads to walk around and look at things from various perspectives..." (ibid, p29), but, unlike Schon (1983) she does not see the necessity of reframing, except through questions such as those proposed by the Open University course "Curriculum in Action" (Study Guide, p80) or by Roberts and Chastko (1990, Study Guide, p80) although these are never as straightforward as they appear. Stringer (1993) shares these views while advocating the importance of shared reflection (ibid, p85). He views the benefits in terms of the many lessons learned in identifying features of his project that were difficult or that diminished enjoyment. He then considers how far the project achieved what it set out to do through feedback. Again, feedback is something most science technology practitioners rely upon.

Peers (1993) similarly advocates shared reflection, this time through the use of initially private reflective diaries which might eventually bring about student-driven discussion. Fox (1993) further shows how the use of reflective diaries kept by his students created the opportunity for him to reflect on course-members' learning experiences and to clarify his own role. They provided feedback similar to that enjoyed by Stringer (1993) and Peers (1993) and allowed discussion about the effectiveness of his tutorial sessions which could then inform decisions for future change. Again, feedback is seen as important by most science technologists.

Tresman and Edwards'(1993) contributors believe that a reflective approach will create better practitioners (Lewis and Dowling 1992, p27-28) and yet fail to acknowledge that reflection is a retrospective activity and so may be selective. They do admit however that some of their contributors were initially very reluctant to engage in reflection (Soper 1992, p28-30) and that many saw it as an intrusion into teaching practice. They go onto to show how the same people now value it but offer no explanation why these people suddenly became converts; Soper for instance, admits that "...reflection takes as many forms as those who engage in it..." (ibid, p29) without admitting that it is difficult therefore to sustain rigour or objectivity if it is viewed in this way.

In contrast, Handal and Lauvas (1993, p88) advocate reflection on "theory behind action" to elaborate and expose practical theories. Such a focus may preclude the development of teaching techniques but it does develop the ideas of Stringer and Peers (1993) in terms of shared reflection; something which I determined to pursue by developing Baird et al's (1991) model and because it seemed to fit in well with science technology practice.

MY REASONS FOR USING BAIRD et al's MODEL AS A FOUNDATION FOR REFLECTING ON PRACTICE.

A version of the model proposed by Baird et al (1991) was selected to reflect on my own practice of lesson delivery because it appeared to be comprehensive, straightforward and was based on research lasting more than three years involving over 400 individuals (students, teaching and academic consultants).

It was considered comprehensive because it investigated teaching AND learning, the process of change with experience and the ways of bringing about change. The study involved both preservice and experienced lecturers and identified two types of reflection; professional reflection and phenomenological (personal) reflection. The results were analysed in terms of cognitive and affective development while recognizing that time, effort and support are all necessary to facilitate change (Baird et al 1991, p61). It was similarly acknowledged that individual learners construct their own understandings (ibid. p62) and that this theory was not knowledge driven but instead was investigative; somewhat like what I have in my own practice.

The model was considered to be straightforward in terms of Baird et al's acknowledgement of difficulties in reflection and because they alone offer tried and tested suggestions as to how it might be brought about. They recognize that for Science Technology Students to change, their lecturers must change first and that collaborative action research may help to promote lecturers' intellectual development (ibid. p62) because different skills and perspectives can be delivered first-hand, not transmitted secondhand as Handal and Lauvas (1987) suggested. A holistic approach is taken in recognizing the interrelatedness of attitudes, the nature, purposes and progess of lessons, and the importance of existing knowledge. They use triangulation in the development and statement of their model (ibid. p64) something that no other models can lay claim to. The procedure therefore supports change by the sharing of the endeavour (ibid. p62) and because that seems relevant to science technology it is worth developing as an idea.

Similarly only Baird et al employ personal (phenomenological) reflection to provide insights into teaching that would be unobtainable by other methods (ibid. p76). They also recommend support during the demanding and unsettling change process while acknowledging the differences between lecturer- and Science Technology Student-perceptions and that the key to bringing about change through reflective practice lies in the setting of concrete goals and clear indicators of progress or lack of it (ibid. p73). Teaching is recognized as being pluralistic and relativistic and not fixed and invariable (ibid. p77).

Finally, the essence of Baird et al's model is "...collaboration between lecturer and Science Technology Students in reflecting on and acting to improve the quality of teaching...in science classrooms..." (ibid p65). Through "...making lecturers reflect more deeply about their practice..." this "...enhances reflection leading to positive change in classroom attitudes, awareness and actions..." and leads to "...improved enjoyment, working harder and understanding more..." (ibid. p68-69) and because this is what the researcher hopes to consider, a modified version of Baird et al's model provides an excellent means for this in the science technology arena.

A PROPOSED MODEL FOR REFLECTING ON PRACTICE (BASED ON BAIRD ET AL'S MODEL)

Stage One
As in Baird et al's model, the lecturer, Science Technology Students and another member of staff ("the observer") prepare a written response to a shared perceptions form after a lesson is delivered.

Stage Two
In similar vein to Baird et al, these anonymous forms can be collected by the observer but in the given circumstances (because unlike in Baird et al's study the observer is not an academic consultant but is instead a supportive contributor) the forms can be analysed jointly by the observer and the lecturer and the differences and discrepancies collated. This will produce unrefined and raw phenomenological reflections from Science Technology Students, in their own language.

Stage Three
The lecturer can then record privately what was found along with his phenomenological reflections and then discuss these with the observer as suggested by Baird et al's model.

Stage Four
Slightly differently to Baird et al's model but still in keeping with it, Science Technology Student/ lecturer/ observer phenomenological reflections are used to inform the lecturer's professional reflection. The lecturer in consultation with the observer can draw up an action plan of a number of changes suggested through Science Technology Student perception forms. These changes could be aimed at improving practice.

Stage Five
A lesson can be delivered which incorporates these changes as per Baird et al's model.

Stage Six
The lecturer, Science Technology Students and observer prepare a Written response to a further shared perceptions form which should hopefully record the improvements as implemented. Baird et al's model would predict that these forms should show more positive responses, particularly from the perspective of Science Technology Students and the observer.

Conclusions and Comments

Having reviewed a number of well known models used in reflecting on Practice, I found that proposed by Baird et al (1991) to have a close match with my own science technology practices.

I determined to adapt this model further to produce my own which mapped very closely with what I wanted to do and it is this six stage model that I suggest other science technologists might like to use when considering how they might wish to improve their own (and their students') experience.

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Bioinformatics – An Overview

Stephen J Gamble

Bioinformatics seems to be one of those new buzz words that has just sprung upon the scene, but what exactly is Bioinformatics? This paper will outline the field of bioinformatics. Although there will need to be some discussion of the biological background to some of the processes this will not be an in-depth primer on molecular biology.

In a way bioinformatics is really just a new name for something that we have all, as scientists, been doing all along. That is collecting data, analysing it and drawing conclusions. Bioinformatics is specifically handling information from biological data. Studies such as the Human Genome Mapping Project have generated vast amounts of data. These have required the establishment of an army of specialists to handle the data, and so the separate discipline of bioinformatics has become established. When the (UK) Medical Research Council established its Human Genome Mapping Project Resource Centre (HGMP-RC) about half the resources were devoted to bioinformatics. The early development of the HGMP-RC computing network has been described previously [1].

The main bulk of bioinformatics work is still directed towards the analysis of genomic data although increasingly bioinformatics is evolving into the study of proteins (proteomics) and carbohydrates (glycomics) as well as other biological data. Originally bioinformatics was only interested in 'is a gene present or not', but as it has moved more towards the application of the science it has started to embrace more statistical methods as well.

DNA (Deoxyribose Nucleic Acid) is made up of strings (sequences) of nucleotide bases. Typically a researcher in the laboratory would sequence one or more short lengths of DNA from an organism. They would then use bioinformatics to compare these sequences with libraries of known sequences to see which other organisms contain the same or similar sequences or where the sequence might fit into the genome of the organism. This process is called alignment. By looking at similar sequences across a range of organisms it is possible to work out evolutionary (or phylogenetic) trees. As genetic sequences are discovered they are stored in a number of centrally run databases, for example GenBank, which form the sequence libraries.

Many different tools have been developed which have a similar function, for example there are a number of different programs for checking alignment. Amongst the most popular of these is the FASTA program developed by Pearson and Lipman in the late 1980s. This is considered by many to be one of the more accurate alignment tools. The input data for all programs must be organised in a structured manner. FASTA has its own structured data format called FASTA Format, which has become one of several common data formats used by many other programs. Another widely used sequence alignment tool is called BLAST (Basic Local Alignment Search Tool) which is a fast search tool. The BLAST program can use a lot of resources, but there are several centres around the world which offer free access to their BLAST service, for example the Sanger Institute (www.sanger.ac.uk).

Within the cell DNA is transcribed to a messenger molecule called RNA (Ribose Nucleic Acid) which is used as a set of instructions to build proteins. Within many cells, particularly mammalian cells, only a small proportion of the total DNA is used to carry the code for a protein. These coding areas are the genes. However, the genes are interspersed amongst the rest of the DNA. There are a number of bioinformatics tools which search amongst the DNA sequences from a particular organism to identify genes. The DNA which does not code for genes is often referred to as junk DNA, but it should be more correctly thought of as DNA of no known function.

Whilst sequence comparison is still a large part of the work of bioinformatics the field has started to broaden and now there is much work looking at the three dimensional structure of not only the nucleic acid molecules but of the proteins coded by them. Also the increasing use of microarray (or genechip) technology, which is a rapid method of screening samples for the presence of particular genes, has generated vast amounts of data.

To a large extent modern bioinformatics has been made possible by the availability of relatively cheap and powerful computers. In the early days bioinformatics relied on relatively small sets of data processed by large expensive computers such as IBM mainframes or VAX computers. Many of the tools used in bioinformatics have been developed in the academic community where Unix based computers are popular so most of the tools have migrated to Unix and the closely related Linux systems. The purists within bioinformatics think that bioinformatics should be done on nothing less than a large Unix system, but as desktop PCs have grown in power so more tools have been built to use them.

Although there are many standalone bioinformatics programs to perform specialised analysis, many of the basic bioinformatics programs have been assembled into large suites of programs. Amongst the earliest suites of programs was the GCG package, originally put

together by the Genetics Computer Group at the University of Wisconsin but later run as a spinout company. More recently the very popular EMBOSS program suite has been put together. (At the time of writing this was available as a free download for a variety of computer systems from www.emboss.org.) This originally started as a collaboration between the HGMP-RC, The Wellcome Trust Sanger Centre and the European Bioinformatics Institute.

The growth of bioinformatics has occurred at the same time as the growth of the internet so it is not surprising that there are many bioinformatics resources available on the internet. In the UK many tools and databases are made available by the Sanger Institute (www.sanger.ac.uk) and the European Bioinformatics Institute (www.ebi.ac.uk). A wide range of resources are made available from the US National Center for Biotechnology Information (NCBI) (www.ncbi.nlm.nih.gov).

As bioinformatics has grown in importance it has started to become part of many undergraduate biology courses. There is also a growing market in continuing professional development courses and short courses. Some courses are also available as distance learning options. Institutes which have recently advertised short courses include the University of Westminster, University of Hertfordshire and the University of Oxford. Online bioinformatics training can also be found at the European Bioinformatics website (www.ebi.ac.uk/2can/home.html). Other information about bioinformatics is available from the UK Bioinformatics Forum (www.bioinformaticsforumuk.net).

Just as Bioinformatics because a separate discipline within biology, so bioinformatics itself is beginning to fragment. For example, another emerging field is neuro-informatics which is that area of bioinformatics which deals with data relating to the brain and nervous system.

Molecular biology is a rapidly developing field. Bioinformatics also needs to develop at least at the same rate to keep up with its biggest customer. As time moves forward I see there being an increasing demand for bioinformatics.

I would like to thank Ian Gray for his encouragement and support to write this paper.

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‘Gis a job, I can do that’

Some thoughts on employment applications by Alan Gall, IST Archivist.

An ex-girlfriend of mine once went for a job in the labs at Pilkington’s Glass Works in St.Helens. Prior to the interview all applicants were shown around the company’s impressive glass museum to give them some understanding of the production process. Finally, it was time for the face-to-face confrontation. ‘So’, said the interviewer, ‘what exactly is glass made from?’ Reply: ‘Erm……’

Not that I’ve been free from the odd gaff myself. I remember applying to the Metal Box Company for a job testing inks. No sooner had I taken a seat than my inquisitor asked, ‘do you ride a motorcycle?’ Astounded at this piece of deduction (I hadn’t listed it as one of my interests) I responded that, yes I did, and how did he know. To my embarrassment he replied, ‘I can see the dirt-marks that the goggles have left on your face.’

These days, running an electronics company, I’m on the opposite side of the desk. We routinely receive job applications for technical posts and I am often surprised by the poor standard of CVs, even from graduates. At the other end of the scale, the phraseology is sometimes a little overdone. I was recently amused to read a CV in which someone had written about himself: ‘an obviously bright young academic with an equally bright future in this ever growing, complex field of electronics. Is firmly on the first rung of the ladder and only requires good guidance from a future employer with vision and skill enough to offer an appointed goal.’ Alas, our company did not have the necessary vision and skill.

It must have been said a thousand times – there is no excuse for incorrect spelling on a letter of application or CV. The impression given by bad spelling is a total lack of effort in preparation – or am I just being old fashioned? I don’t claim to be a good speller but have always used the maxim ‘If you can’t spell it, don’t use it (or look it up)’. There is even less reason for mistakes if a modern word processor is available.

Future employers like to think that you are going to work your socks off, so foster this impression. Don’t, whatever you do, insult a previous or current employer. The applicant who said that the reason he wanted to find another post was that ‘his gaffer was always getting on at him’ provoked the natural thought, ‘why does his boss need to?’

A bit of preparation doesn’t go amiss. Much can be discovered about a prospective employer’s activities after a few minutes spent on the Internet. Someone who has taken the trouble to find out a few basic facts will always give a good impression. However, likes and dislikes depend on individuals. Your face may just be the wrong shape as far as an interviewer is concerned. If you didn’t get the job, there may be some useful tips to be had for the future by asking ‘why?’ Sometimes the element of luck steps in. You might have listed under ‘hobbies’ a subject of profound interest to your interviewer. In fact, the episode at Metal Box, mentioned above, didn’t go too badly – my potential boss was a keen motorcycle enthusiast. But beware of listing any interests that you can’t adequately discuss with someone who can expose your ignorance.

An ex-girlfriend of mine, now wife, once went to an interview for a place on a teacher-training course. She was asked for her thoughts on educational priorities. Reply: ‘I think that it’s important to teach kids the basics, like bananas come from…..erm……’

Chairman's Annual Report March 2007

Another day; another dollar. Another year; another... What? Well, salary if the spirit of the original adage is to be maintained, but as none of the IST officers are paid for their efforts that is hardly appropriate! Milestone? Well it's certainly been a year of major change, not least in an administrative sense. Opportunity? Definitely. It sounds a bit hackneyed, almost straight out of the boardroom of some target driven, aggressively marketed Fund Management Company run by power dressed "city" types! But there is also the view that every threat is an opportunity and to some extent I have some sympathy with that. It's my view though, that we have to create our own opportunities and life being what it is, those opportunities are often driven by change elsewhere, since we are all largely dependent on quite complex relationships which are normally out of our control. Often, change is need driven and more often than not in these situations we have choices about how to respond. Call it what you will, however, I always regard the annual report as an "opportunity" to take stock, look back and, more importantly, look forward.

Looking back is largely good progress dotted about with small amounts of frustration. Very good progress has been made on the administrative front. Although we had an excellent relationship with CAATS in Lichfield there were an increasing number of areas where we felt we were both beginning to suffer from our diverging interests, even though our core shared interest in the development of our Technical Certificates remains strong. Our "new admin team", for the want of a better phrase (all suggestions welcome!), Joan, Louise and Wendy, have been working hard in our best interests since our move to Sheffield (and for a while before!) and I would like to thank them all for their support and efforts for making the move as smooth as it possibly could have been. We have small but growing numbers of candidates studying for our Technical Certificate, the Higher Diploma has seen a resurgence in Ghana with four recent passes at a good standard and the University of Birmingham has signed up a another cohort of CPD candidates. Last week we paid a visit to Cambridge University Staff Development unit to talk to them about our CPD award; they had received a significant number of expressions of interest from a variety of support staff. We have made what I feel are real advances in our marketing and the way we present ourselves. The new-look folders, flyers, stationery and Journal have been well received and feedback is very positive. Our broader, more inclusive membership policy (specialist, technical and managerial staff) seems to be paying more dividends and the market research we have done so far points strongly towards a need for mentoring support for our members who are in the early or middle stages of their careers.

The frustration essentially comes from waiting for other things to happen over which we have little control (but see paragraph one above!). We are however confident that things will develop in the very near future and we will continue to put effort into oiling the wheels where we can. Financially we are looking sound. You will see from the accounts that we are just about breaking even and, considering the fact that we had a few long-standing bad debts to write off and additional expenses associated with the move to Sheffield, this is encouraging.

But what of the future? Well, it's looking good! We are well placed with qualifications and support packages for new training initiatives we very much hope will soon be available as a result of the HEaTED project and we are working on the development of a mentoring support network. For those of you who are not aware of the HEaTED project it stands for Higher Education and Technicians Educational Development (now you know why we use acronyms!). This was essentially a national training needs analysis survey and it is hoped that following this the steering group will be able to obtain funding for further training and development work. More mentors are still needed so if you haven't lodged an interest with the office yet please do so. If you are interested but are not sure you have the skills or will get support, we will be arranging events to tell you all about it, what's involved, what the benefits are (for both parties), and how to go about it.

We have also just been asked to accredit a new qualification for IT Managers so this looks like another opportunity to broaden our membership base. If any of you have skills in this area and are interested in being involved in the accreditation process please contact the office. If you are wondering "what's in it for me?" it boosts your CV significantly!

As usual, the Executive and members of the Boards will be doing their best to keep an eye on what developments are going on in areas where our members work, but extra information and different perspectives are always welcome. Please don't hesitate to get in touch – you'll be more than welcome and whatever you can offer will be appreciated. We do have a lot of work to do in the future, not least in terms of marketing, getting our image right and recruiting more members, especially those at the early and middle stages of their careers. Remember; it's your Institute, it's more than the sum of its members and together we can make a difference.

John Robinson
Chairman

CPD – One year on and where next?

It is now over a year since the first two candidates completed the CPD and we thought it would be interesting to get in touch with them to ask them to look back at their experiences and see what they are doing now. You may be asking yourself "Why two candidates?" It is important to understand that there was considerable but very friendly rivalry between Ruth Perry and Avril Rogers over the issue of who completed the CPD award first. This is unlikely to be resolved since both IST and The University of Birmingham went to considerable pains to ensure that both were presented with their certificates at exactly the same time. What is true, however, is that they were mutually supportive and real enthusiasts; Ken Jakeman, Deputy Manager of the School of Biosciences at Birmingham told me he had been phoned at home on a Sunday afternoon on more than one occasion with CPD-related queries!

Ruth was the first I made contact with over the phone. She works in a busy plant sciences research laboratory so it took me a couple of goes before we could take a few minutes out to chat. She started work at the University of Birmingham after 'A' levels at school and studied part time for a BTEC and then an HNC. She followed this with an OU degree and then an MPhil, starting the CPD program straight after her MPhil. No gap year for Ruth then!

She has had quite a wide background in lab skills over the years, starting with field trials on brassicas and other crops before moving on to poppies and then bananas. It was working with bananas that she first started to use PCRs (polymerase chain reactions) to look at genetic markers to help overseas growers of banana plants. She then moved to a bio-remediation lab at the time of her HNC studying the use of sulphate-reducing bacteria to treat chromate wastes from tanneries before finally ending up where she is now, working with algae at a molecular level. She currently does quite a lot of surface testing to find out how to avoid one of the oldest problems for mariners; keeping seaweed off the bottom of their boats.

I asked her about the ups and downs of doing the CPD and she said "I did it because I was intrigued by the potential of the qualification. I floundered quite a lot in the early days but eventually got to grips with it with the help of colleagues. It was useful in that it highlighted the skills I already had and gave me a better idea of what I wanted to go and do." As we chatted on, that turned out to be a managerial role in a technical environment, but she pointed out that such positions tend to be few and far between at present. She is not, however, idly biding her time waiting for the right vacancy. She has stayed with the CPD programme and

is currently working as an assessor for a colleague doing the CPD in Physics and Astronomy and hopes to complete her A1 qualification. The colleague works quite a lot in Switzerland but so far Ruth is disappointed she has not had an invitation to go over there to assess. As if that is not enough she is also doing an ILM Certificate in Team Leading and in between all that manages to ride her own horse and get involved with Race for Life to raise funds for Cancer Research UK.

Avril currently works in a teaching environment in Metallurgy, although she has a number of years' experience of working in research laboratories. She became involved with the programme because, although she felt skilled, she also felt there was nothing beyond the normal HNC or Degree. She also felt that there was no recognition for her workplace skills and the things she did which were outside the scope of normal academic qualifications. She recalls that she had discussions with Myrt Bradley, in the Training and Development Unit, about this and eventually Myrt found out about the CPD which at that time was pretty much untried and untested. On reflection she feels that Birmingham piloted the scheme. It was her expectation that there would be lots of experienced people out there to tap into for support, but that just wasn't the case. (From the IST perspective, Birmingham were trailblazers, not pilots! – Ed.) One of the things that she likes about the CPD scheme is that it goes much wider than the limits of the workplace. It takes into account skills that she has used outside of the workplace and recognises them within a work context.

Avril's outside interests are wide and varied; she describes herself in her broad and jovial Brummie accent as a "social butterfly" who enjoys dancing, but

omitted to say what kind of dancing. We will just have to guess. What we do know, however, is that when she's not at work she teaches computer courses, gets involved in community work and is a volunteer at the local Arts Centre where, amongst other things, she has been trained as a projectionist. Avril is also working towards becoming a qualified assessor and reports that, like CPD, progress in the early days is slow, although the meaning of "slow" when used by someone who completes the CPD in one third of the expected timescale probably requires a more precise definition!

Avril hopes eventually to be able to work in the prison service in a training type of role but is having difficulty trying to find a route to this and tells me that such positions are rarely advertised. If any of our other members can offer advice on this please get in touch with our office.

What struck me most about Ruth and Avril is the enthusiasm and drive with which they approach their lives and their work and this approach was clearly the reason for their success. The CPD scheme was there as a new qualification; although people had used the standards and done the testing nobody had actually gone through the whole process from start to finish. We (IST) had made presentations about the CPD in several Universities and although interest was strong most Institutions we visited were dithering about at the water's edge waiting for somebody else to dip their toes in. We are grateful to the University of Birmingham and those members of staff involved for diving in head first and taking a leap of faith.

One of the frequent questions we face about the CPD is what is it worth? It doesn't relate directly to any academic qualification, neither does it map to any NVQ, either in level or specificity. As it's new and IST has limited funding available for marketing, most people in most Universities have not yet either heard of it or been able to form an opinion of its' "worth". What we do know, however, is that it is a serious chunk of work directly related to the candidates' jobs and when they have completed they will be occupationally competent in the truest sense of the word. They will have considered their work and how they approach it. They will have learnt by their mistakes and improved the way that they do things en route. The best comparator we have so far is that we were approached by City and Guilds following a presentation in London to run it as one of their senior awards; licentiateship (LCGI). This we could do by obtaining licence from C&G, but it would affect the cost significantly. This would have to be passed on to the employer and our current strategy is to keep the CPD cost as low as we can.

The CPD's true worth, though, is the benefit it brings to our members as recognised professionals. Ruth and Avril are modest (if a social butterfly can be modest!) and they clearly don't regard themselves as trailblazers but, in IST terms, that is what they are. They have been through a learning experience and are the richer for it. It wasn't easy; there were times when they struggled but they saw it through and, like all learning experiences, what they got out of it was directly related to the effort they put in. IST recognises that and holds such effort in high regard. We look forward to receiving Fellowship applications from both of them in the future.

Progress?

Steve Gamble, MIScT

In 1969 Men from the Planet Earth travelled to the Moon. On the surface of the Moon they worked away for long hours in a small space crammed with electronic equipment. Their shelter on the desolate Moon was made from a few corrugated metal sheets and insulation held together by fine metal struts. The outside of their small craft carried a plate etched with the names of the astronauts and the US President.

On the way to the landing, their computer ran slowly and ran out of memory. It crashed several times and had to be restarted. The guidance system nearly landed the craft in a field of boulders.

In 2007 many of us work in corrugated metal boxes in the middle of remote fields. The outsides of our metal boxes carry the names of the local graffiti 'artists'. We work for long hours in cramped conditions surrounded by electronic equipment. Our computers still run slowly, frequently run out of memory and often need rebooting. And satellite navigation still tries to lead you into fields of boulders!

So in nearly forty years have we made any real progress at all?

Like the Moon landing programme, still too many science projects get cancelled just as they are beginning to show results.

UK Chemical Industry Tackles Climate Change

On Wednesday 17 January 2007, energy executives from the UK chemical industry met to discuss the new Energy Policy for Europe, designed to establish a pathway to combat climate change and boost the EU's energy security.

Steve Elliott, Chief Executive of the Chemical Industries Association (CIA), said: "Our members are very focused on energy efficiency and security of supply. Last winter doubts over security of supply meant UK industry was severely hit by volatile energy prices when sites had to shut down, reduce production or switch fuels."

The meeting will address the findings of the recent energy sector inquiry from the EU Commission, as well as look at the future drivers in electricity and gas markets and recent consultations from the Energy Review such as the planning regime, gas security of supply and renewable energy.

"We will set clear priorities for 2007 and beyond to ensure that CIA members are well informed of energy policy decisions that will have an impact on their business decisions. It is important to understand the fundamentals of energy markets into the medium term so that the chemical industry can adopt appropriate strategies and remain competitive," added Dr. Helen Bray, CIA Head of Competitiveness and Utilities.

One million milestone exceeded as government steps closer to reaching Leitch's ambition (Department of Education and Skills)

Figures published recently reveal that the Government is one step closer to meeting Lord Leitch's bold ambitions for the UK to become a world leader on skills. Almost three-quarters of the workforce now have a Level 2 qualification (the equivalent of five good GCSEs) and the minimum skill level required to get a job and improve their productivity. In addition, over half the population has a Level 3 qualification, the equivalent of two A levels. Sandy Leitch challenged the Government in December 2006 to get at least 90% of the population equipped with Level 2 qualifications by 2020.

Compared to four years ago, 1,141,000 more adults are now qualified to Level 2, exceeding the one million milestone set for adult skills targets for the end of 2006. The final Labour Force Survey of 2006 shows that 73.9% of adults in the workforce now have a Level 2 or equivalent qualification; this corresponds to around 17.5 million adults from a total economically active population of 23.7 million. In addition, 52.4% are now qualified to NVQ Level 3, corresponding to around 12.4 million adults out of the total.

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Reverse of cover page.

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