S-Lab Case 14: Sustainable Laboratory Practices at the University of Manchester

Efficient and Effective Shared Services

A key design concept of the University's Michael Smith Building, which opened in 2004, was 'skybridges' to adjacent buildings housing life sciences and medicine research and teaching. These were added in 2008 and enabled delivery of Core Central Services (CCS) to all the Life Sciences Faculty. CCS now includes autoclaving, equipment servicing and PAT testing, glassware washing, a 'Media Kitchen' (see over) and stores. CCS Manager Rita Newbould has proven that centralisation can provide a much more efficient and effective use of resource than local provision. "*For example, central autoclaving allowed us to phase out over 10 local units, and to operate on very high loadings*." Plans are now progressing to expand CCS delivery to Faculty of Medicine researchers occupying bridge-linked buildings, and others within an Oxford Road 'Biomedical Corridor'. This includes central provision of centrifuges, which in addition to increasing utilisation levels ensures - by requiring a swipe of staff identity cards to enable use - that users are well trained, and provides a record of use in case of any problems. A new protein expression service is also able to save researcher's time and resource by providing specialised guidance.

Rita Newbould

Limiting the Use of Ethidium Bromide

Ethidium Bromide has traditionally been used as a cheap and efficient stain to enable visualisation of DNA and RNA following electrophoresis for diagnostic and purification purposes. However, it is carcinogenic and mutagenic, requires potentially hazardous UV light to illuminate it, and creates hazardous wastes which are costly to dispose of. The hazard is not only to immediate users as contaminated buffers can spread unseen stain to door handles, computers etc. within laboratories. Trials by Peter Reid, a Senior Technician in Life Sciences and Faculty Advisor for Non-Ionising Radiation, identified two suitable replacements for all but the most sensitive of applications. These have two additional benefits of being visualised under a blue light illumination source, or with an interlocked UV source, thereby preventing exposure to UV, and wastes can be disposed of through normal bin and sink routes rather than by incineration. As a result, the alternative stains have been promoted within the faculty and many scientists have adopted them. This also allows them to be purchased in bulk, and supplied from central stores.

Other Good Practices

- Faculty Heads report annually on sustainability progress.
- A sustainable lab group has been established and is conducting lab assessments (see S-Lab Briefings 3 and 7).
- Emptying the contents of all freezers into a mobile unit each year to allow defrosting and checking that contents are still needed (see S-Lab Briefing 4).
- Recovering waste silver from X-ray processors via special cartridges.
- Establishing a 'library' that will take in redundant equipment, test and if necessary repair it, and loan out. There is an immediate recall "in as lent condition" to donors.
- Research advantages and energy savings from installing LED lighting in growth chambers.
- Feeding the central CO_2 service from a liquid storage tank rather than a cylinder bank, thereby reducing deliveries.
- A detailed energy audit of the Chemistry Extension (see S-Lab Briefing 2).

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Good Practice in Geochemistry

Catherine Davies is a Senior Analytical Research Technician in Geochemistry and manages numerous laboratories including a suite of clean rooms. She believes that "*laboratories run safely and efficiently if students are instructed, advised and trained. This is vital for a busy lab to be sustainable. We already stress the need to use chemicals and equipment efficiently – for example, we've brought a smaller drying oven to avoid putting part loads into a larger oven. I plan to include more on sustainability in future inductions. Another thing we highlight is closing fume cupboard sashes as we have to use hazardous chemicals and this minimises potential risk. Fortunately, as trained chemists, we've created a sash closing culture which we've been able to maintain. Fume cupboards also need to be regularly maintained. We used to have a lot of alarms but have reduced these by ensuring that the air vents aren't blocked by chemicals or equipment, and liaising with Estates to regularly check if filters are clogged*." Other good practices in the Geochemistry labs include using a microwave oven rather than hot plates to digest samples (reducing the reaction time significantly); rinsing with deionised rather than distilled water; avoiding multiple rinsing of post acid bath-glassware by soaking it in a water bath instead, and replacing older light fixtures with 12W high efficiency bulbs controlled by microwave sensors.

Catherine Davies

Good Practice at CIGMR

David Carthy, Laboratory Manager at The Centre for Integrated Genomic Medical Research (CIGMR), participated in the S-Lab assessments and found it "*really useful to look at other labs in detail and share experiences with other managers. I had been wondering if we could get motion-controlled lighting so when I saw it working in Geochemistry I suggested it in our next internal lab meeting – which often discusses environmental issues - and it's now being piloted*." The assessment also highlighted CIGMR good practices, including electronic sample tracking; use of specially developed labels to cope with cryogenic conditions; producing stock solutions centrally to reduce waste; donating unused equipment to other labs and diluting (after pilot tests) reagents such as size standards for gel electrophoresis and gel red to a greater degree than vendor's instructions to conserve resources.

Sharing Fly Food

University life science researchers use over 200 litres of fly food a week. This must be nutritious and sterile, and is costly to buy. The 'Media Kitchen' – which was established as a Core Central Service (CCS) to provide agar plates and other media – therefore experimented with its production. CCS Manager Rita Newbould recalls that "*we had to work hard initially to persuade users that the food was suitable, especially as we had some early problems with condensation in the food containers causing maggots to drown. Through trial and error, we found a solution, and also set up a dedicated area to reduce contamination risks and provide sufficient space for the large containers and mixers. Now we produce it by the ton, saving thousands of pounds a year. I think this is the story of all shared services – even if the cost benefits are clear, many researchers will resist because of legitimate concerns about purity, reliability etc. You have to persevere, and build a trusting relationship with them, to succeed*."

Further Information – www.goodcampus.org or arthur.nicholas@manchester.ac.uk.Version 1, October 2011