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EDITORIAL

Expensive equipment—a guide to purchasing

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Purchasing for the first time a large and expensive piece of equipment for the analytical laboratory can be a challenge. Even experienced laboratory managers can find buying a large piece of equipment quite daunting. Since the competition for funding for large expenditures is always keen, I hope by providing some guidance I can help ensure that your next purchase is successful.

In starting the process to decide what should be purchased, it pays to have a clear expectation of what analytical job the equipment should do. It should also be clear who is going to be responsible for managing the purchase and also who will be responsible for operating and maintaining the equipment. Finally, for other than replacement equipment, it should be clear as to where it will be located and what services (electrical, ventilation, water, gases) are likely to be needed. Sometimes a laboratory needs to be rebuilt to accommodate a large item such as an NMR instrument or an inductively coupled plasma mass spectrometer. All of these questions need to be answered within the constraints of the budget available.

In the routine analytical laboratory, the equipment or specification is usually quite clear, but for those who conduct research or develop analytical methods, there is often a desire for the equipment to do more than it is really capable of doing. Without a clear understanding of what the equipment will be used for, there is a good probability it will either not meet expectations or be overloaded with accessories that will not be used. Possibly an essential option will be missed because its usefulness was not considered. For example, it is tempting to add tandem mass spectrometry capability to a high-resolution mass spectrometer so that analytical capability is increased; however, unless this will be used as a research tool, the additional capability is unlikely to be used in a routine trace organic laboratory.

At this stage of the process, it is worthwhile discussing with sales staff from all of the likely suppliers your possible purchase. Often they can be very helpful in providing information on the capability of the instrument, possible applications, appropriate configurations and options and may even provide a list of satisfied customers. Sometimes, if purchasing a less common type of equipment, it may be worthwhile having the analyst visit a laboratory where one is operating. During such a visit, it is possible to see how the equipment actually performs, its limitations and obtain some idea of down time and maintenance costs. We did this before buying an automatic weighing instrument and on the knowledge gained drew up a specification to purchase one.

Since modern instruments are very dependent on computers to control them, a visit or demonstration is a good way to assess the appropriateness of the control and reporting software. Experience indicates that for many suppliers this is the weakest link in their product as sometimes the software does not actually do what it should. Often a new model or type of equipment is not really usable until an upgrade correcting the faults is available. The computers supplied are sometimes barely adequate for the task in terms of on-board processing capability and disc storage. Sometimes, performance can be improved by upgrading both before purchase as this is usually cheaper than upgrading later. The issue of the software licences should be considered as companies have different licences: some allow use on other computers for data processing; others require the purchase of a second licence for this purpose. Upgrading the printer from an ink-jet type to a laser type can improve productivity and save cost in the long term.

Once the specification has been decided on, the question arises as to who will supply the instrument and at what price. Many organizations such as government laboratories, large corporations and universities will insist that a competitive tendering process be used. This is to ensure

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the lowest price, or "best value". While the process will be dependent on the organization's requirements, there are some general principles that can be applied. The advantage in having a competitive process is that prices are often discounted by suppliers to ensure they win the order.

In some cases it is not possible to have a competitive process. This can occur if there is only a single supplier. Otherwise a sole source justification will need to be prepared. Such justifications must be based on performance factors or some other requirement. Methods developed on one type of mass spectrometer system are not always easily transferred to another made by a different supplier using other software. A sole source justification may be applicable in that situation as costs incurred outside the tendering process are high in relation to the cost of the purchase.

The specification that is prepared should not reflect a particular manufacturer's product. If there is only one possible supplier, this is an easier task. If there are multiple suppliers, various factors need to be taken into account in drawing up the specification. It should reflect the key aspects of the equipment needed, and not aspects such as the colour of the cabinet! The specification should include details such as delivery date required and exact location of the point of delivery. This is not always trivial; for example, a colleague's laboratory required a mass spectrometer to be delivered to the second floor of a building through a window by means of a crane! Special equipment may be needed to unload a magnet weighing 1 t or more.

If the tender is likely to go outside your country, electrical requirements need to be stated. We normally request certification by the Canadian Standards Association or recognized equivalent to ensure Canadian safety standards are met. This may not be included in the quoted prices. If your laboratory is in North America, you may need to request conversion fittings from metric to imperial if the supplier is European or Japanese. If training either at your laboratory or at the factory is to be provided, it should be stated in the specifications. If there are many possible suppliers all meeting the specification, for example liquid chromatographs, price may be the deciding factor. A review of all bids against clear, well-written specifications will quickly eliminate unacceptable suppliers and then the lowest-priced supplier gets the order.

For more expensive equipment, i.e. equipment costing more than $500,000, price alone may not be the deciding factor. This is when the "best value" approach is useful. Before tendering, the various factors contributing towards an overall score are decided on. These may include factors based on performance and not just describing the hardware and software needed. For example, appropriate samples can be sent to interested suppliers and the results returned for evaluation by a committee of technical experts. My staff used such a process to buy a high-resolution gas chromatography–mass spectrometry system. Factors such as resolution signal-to-noise ratio, detection levels and response factors were used to assess overall performance. In this particular case, performance was critical for delivery of the intended analytical work. As long as we stayed within budget, price was less of a factor. To assess the bids a scoring grid was developed where 75% of the marks went to performance and only 25% to price. At the end of the tendering period, two bids were received. After evaluation against the pre-established criteria, one supplier could clearly offer a better performing instrument but at a higher price. Since price was a lesser factor, we ended up buying the more expensive (by $92,000!) of the two instruments. We were able to demonstrate "best value" even to the unsuccessful bidder by use of a fair process.

Other factors that could be built into a tender specification are an estimate of life cycle cost. For example, service contracts for an instrument such as a high-resolution gas chromatography–mass spectrometry system are typically about 10% of the original purchase price. The difference in cost of a service contract over 10 years provided from a nearby location or one located on the other side of the continent, if travel is extra, could be more than the difference in purchase price between competing suppliers. Another factor that could influence a bid is delivery date. As we are a government laboratory, it is important that goods are received before the end of the fiscal year. Since the tendering process can be lengthy, it is worthwhile to specifying a realistic delivery date. This may impact the cost as it may require air freight to meet the delivery deadline rather than shipping by sea or ground transportation.

Hopefully, I have shown that the process of purchasing large and expensive analytical equipment is one requiring effort and thought. It is different from buying a house or car for our personal use because we have to demonstrate the best use of someone else's money. But if the end result of all the money and energy expended is an instrument that provides high-quality analytical results for a long time, success has been achieved.

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