



AWARDS

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POSTERMINARIES

Lost Materials

A couple of years ago I was leaning over the back of my narrowboat, moored outside my house, when my mobile phone (cellphone to many of my readers) slipped out of my shirt pocket and splashed into the canal. This was annoying, and fairly expensive (it was a nice phone!) but the greatest damage was to my family credibility, not my wallet. As with most inland canals, the water is only about 1 meter deep but is totally opaque. I therefore took off my trousers and shoes and lowered myself gently into the water to feel for the phone with my feet. Surely it could not have slipped sideways more than a few tens of centimeters so I knew its position quite accurately. However, after 20 minutes of gentle toe-exploration among the sediment and a few tree roots, I had to give up. Family credibility was not saved, and the incident is still on occasion recounted against me. This is an example of something whose position is known to within much less than 1 m³ but which cannot practicably be retrieved.

There is an information analogue to this concrete example. I cannot be alone in the experience of knowing that I have seen a piece of information recently but not being able to remember or discover where. This can happen after surfing the web, or after reading an old-fashioned "paper resource." I perhaps originally discovered it six clicks after a Google search, but have subsequently closed the browser—thinking that I was going to move on to some other task. Alternatively I may have thought "must make a note of that" while reading a book, only to be trapped into reading a further few pages and then not being able to re-locate the gem. Irritatingly, books are (at least on paper) not readily searchable for keywords and even the Web or an e-book is not readily searchable for ideas.

It helps greatly if one has a mental "map" of the subject area in which your elusive information or gem of wisdom resides, but such maps are not easy to construct, as I have found recently. My team at the U.K. Centre for Materials Education has embarked on a project to gather in one (virtual) place as many resources as it can find associated with the teaching or learning of materials. The sole criterion for inclusion is that the owner of the resource must agree to license it for free use by others—perhaps by one of the many flavors of "creative commons" licensing. Our aim in tackling this task is to provide a site to help those of us who forget where we saw helpful resources and/or did not know they existed. (By the way, if you know of anything which fits our criteria, please let me know.

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In designing our site we of course need to index it, and enable it to be browsed usefully, so we started to look for a "materials taxonomy"—our map of the materials world. Of course we found many examples already existed (thank you, those of you who have thought about this problem), but there are very few—if any—which enable one to cross-relate all the different approaches we regularly use to think about materials. For example, suppose that a teaching resource—say a piece of software or a

video clip—relates to the growth of single crystal silicon for device use. We might want to discover this by an inquiry directed at a particular material (silicon), at a process (crystal growth), at a physical concept (semiconductivity), or at an end use (in a complementary metal oxide semiconductor chip or a mobile phone). Where then do we "file" this resource? Of course we don't; we tag it with what we think are useful tags, and store it in a database somewhere. But then how might it be discovered by someone browsing for "potentially useful stuff"? They need to use a taxonomy!

In a lateral-thinking approach to this we have studied the Web sites of computer retailers. They often offer tickable categories. When you indicate your interest in one category, you are offered a list of relevant sub-categories which contain products, but those sub-categories that exist but do not contain any products are hidden from you. This gives a great deal of browsability, because you can see all the available options at any time, without needing to ask for them specifically. Applying this to materials resources we might therefore tick "semiconductor" and be offered (among others) "silicon." We could also tick "crystal growth" and be offered a useful resource. The same resource, and hopefully others, would be revealed if we ticked "CMOS device" and then "crystal growth."

Thus we hope to overcome the lost materials problem. However, I still need to overcome the apparently simple issue of learning from mistakes. A year after losing one phone in the canal I leaned over again and lost a second! No clever taxonomy helped me find this one either, but I know approximately where it is.

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