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https://doi.org/10.1017/S1551929500054006 Published online by Cambridge University Press

# Fostering LIMS Development Through Open Standards

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At the Microscopy and Microanalysis conference in Honolulu this last August a small meeting was convened to share information and knowledge about implementing LIMS (Laboratory Information Management Systems). The meeting took place at the end of the session on Core Facility Management, through the efforts of Debby Sherman, who is coordinator of the Core Facility Managers Focused Interest Group (http://microscopy.org/MSAUnits/Committees/Facilities.html). In addition to the meeting, I spoke with several vendors (focusing on those vendors we use here at PathBioResource), as well as others who have made some progress in developing and/or installing LIMS.

While no conclusions were reached formally, it was decided to start an informal mailing list to continue the discussion. (You may join the mailing list by contacting me – please include a short description of what LIMS you have and what sort of facility you want the LIMS for).

My own interest in LIMS stems from my work as IT Coordinator for PathBioResource, (http://www.med.upenn.edu/bmcrc) under the direction of Dr. Jonni Moore, which is a collection of resource laboratories in the Department of Pathology and Laboratory Medicine at the University of Pennsylvania School of Medicine. We have an Apple Xserve/Xraid serving all of our facilities and are tying together all of our experimental data into a unified LIMS operation over the next year.

What follows are my brief impressions of what the major issues are with LIMS for microscopy, based on the meeting and talks, along with a set of suggestions for actions that could assist the microscopy community in moving forward with useful and affordable LIMS installations.

There are four goals that are of critical importance.

1. Capturing the necessary information as early as possible in the service stream:
   - Who is requesting the service
   - Who is paying for the service (along with any billing numbers)
   - What is the work about.

   This should be done when the work is requested, not when the work is being done (i.e. Not when the researcher is sitting at the microscope).

   As one of the participants in Honolulu stated:

   *"In addition to the problems arising from lack of standardization among instrument manufacturers, an area where we expend a great deal of development effort is in ensuring that it is as easy as possible for the instrument user to enter database information. The real pay-off in a LIMS system comes only after the fact, when data is to be retrieved. Therefore, convincing users to spend the time up front to enter useful information can be difficult. One strategy is to collect as much data as possible at the time the laboratory request or instrument booking is made, rather than at the instrument."*

   *-Andrew Brown, president of Quartz Imaging Corporation*
2. Connecting the scheduler and instrument log-on into one database, and authenticating off of the university's campus-wide password system.

   This logging information is being correlated with the service request system in (3).
3. Providing a secure server for accessing and archiving experimental results (in this case, images), which is tied into the service request and instrument logging systems.
4. Generating usage logs and invoices automatically from (2), using the information from (1) to route the invoices.

Each of these goals has its own challenges and depends significantly on the particular situation. The first goal is the one that is most generalizable and it is the area that has been suggested as being the most challenging. The key to categorizing images is to understand what the principal investigator (PI) would most want to look for about that image in the future. That is a moving target, and there is no one good solution – but education of the researcher is key to any possible resolution.

An envisioned system would provide some prompting to the researcher to answer a series of questions about the material – what it is from, how it is treated, and so forth. It would be helpful for the MSA to guide developing such an entymology. The next stage is the hardest – what is the purpose of the experiment, and what are the key aspects of the image being studied?

While it may seem trivial, we have found that correctly identifying the proper PI and project to bill has not been easy. It is not always clear in a large lab (or one where the PI collaborates with others) which PI's funds are paying for a particular experiment. It could be the PI, it could be a new faculty member in that lab, or even another lab's PI. The PI from the point of view of research management is not always the same as the billing PI. This has become of critical importance these days with compliance audits becoming much more frequent. Further, lab members do not necessarily know which of the several possible projects in the lab an experiment should be billed to.

We have addressed this problem by setting up a system whereby the PI or the designated lab manager can add projects and assign lab members to them. When the lab member logs on to request a service (microscope usage or analysis in this case), they are shown a list of projects that they are allowed to use. If there is more than one, they still need to choose, so we provide the full grant title as well as the short nickname to help.

Once the request is sent, an email is sent to the facility, and the request is displayed both in the facility log page as well as the PI's log page. A request id is assigned automatically, and this id will be used to track and download the data (this last module is not yet complete).

All of this is written with PHP/Mysql and Oracle. We would be happy to share the code and concepts with others – though much of the work is site specific.

I hope the mailing list will lead to the nucleation of a group of interested individuals that may identify some solutions for these issues. I plan to report progress in future issues of Microscopy Today and to work with others in defining these category and keyword universes. I will also be detailing the other sections 2, 3 and 4 and demonstrating how we have addressed each of them. ■

In the meantime, here are some url's for LIMS:

http://lims.taratec.com
http://limsource.com
http://lims.scimag.com
http://www.limsconference.org
http://pubs.acs.org/hotartcl/ac/00/jan/prodreview.html

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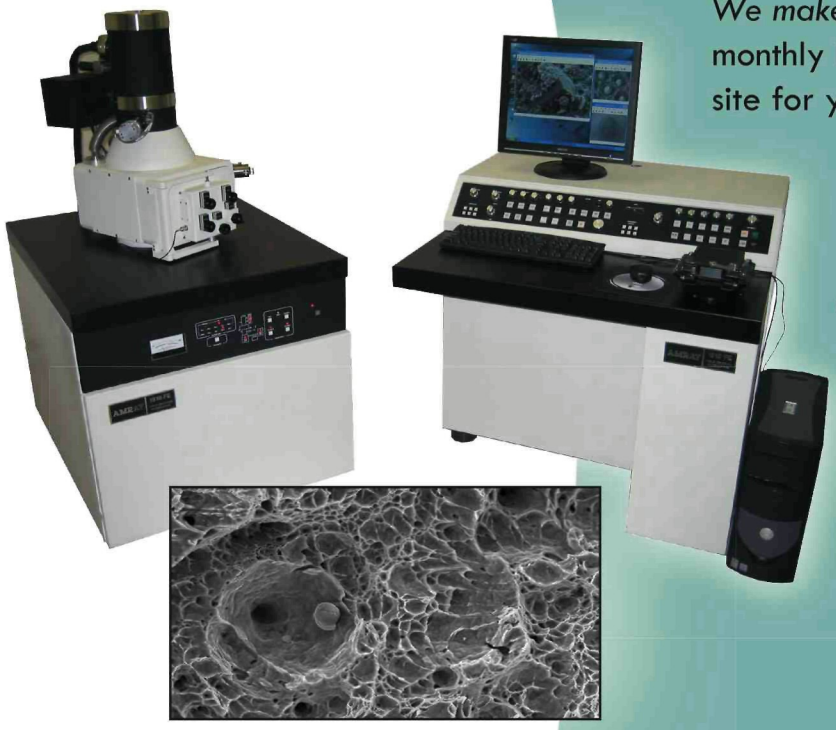

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