

ELN Activation Energy: The Top 10 Reasons Users Won't Use Your ELN & How to Overcome Them

By Wolfgang Rumpf, Ph.D.

Human nature is to resist change. Even if we know the change is for the better, we still resist it. And if we *don't* know for certain that the change is going to make our lives better - our food tastier, the wine more robust - why should we bother putting all the time an effort into changing the way we do things?

When an organization adopts an ELN, they are making a long term commitment and a serious investment of time and effort - they will be trusting whatever system they ultimately implement with their life's blood, the end result of millions - potentially billions - of dollars of R&D money. The last thing that they need to discover is that the fancy, expensive new system they've purchased to store everyone's data isn't being used, or is being used inconsistently, by the very scientists the ELN is there to help.

The purpose of this article isn't to discuss how or why to choose an ELN (although your choice of ELN will certainly affect the severity of barriers to adoption). Rather, we'll go over the top 10 barriers to adoption and describe some strategies to overcoming them. You might not run into all of these at your organization, or you may run into problems not listed here, but hopefully this article will give you some useful advice on converting even the most recalcitrant, die-hard paper-notebook user over to your shiny new ELN.

10. *"I don't always have a computer in front of me."*

One of the most common complaints I've heard in my seven years of working in the life sciences ELN field is that users will still have to use paper for those times when they just don't have a computer in front of them. While this is a somewhat valid complaint, it doesn't really wash. For one thing, with laptops and tablet computers, it's very possible to always have your computer with you. And with the price of desktop computers falling to ridiculous lows, even the hotroom can be equipped with a permanent resident computer. The fact of the matter is that you *can* always have a computer with you, or at least present in the same room with you.

Alternately, many scientists don't actually write directly in their notebook all the time anyway. How many times have you seen someone jot notes down on scrap paper, Kim wipes, whatever was handy, only to sit down later at their desk (maybe over lunch or during a "break") to organize, re-write, and present their notes in a more formal way? For those of us who do their entire notebook authoring in this fashion, we don't *need* a computer in front of us all the time.

9. “What happens if I’m not always online?”

Most ELN’s do require that the user be online for the full functionality of the system to be available. But the fact of the matter is that even without a direct connection to the ELN server, users can often edit and create content and place it into the application (or store it in files on their desktop so that they can be put in the application later) until the user is back online. Sure, the time-date stamps don’t get applied until content is actually put into the system - but this is *still* better than the “wait until next month’s signing party” method of validating your experiment’s time and date stamp. And the pervasiveness of the internet is only going to get *better*. Add to all of these the possibility of accessing your ELN (albeit in a limited fashion) via your Smartphone, and this complaint really doesn’t count anymore.

8. “I don’t even use a computer.”

Honestly, I heard this one from a researcher working at a large government research facility, and was floored. It’s difficult to see how anyone can do scientific research these days *without* using a computer! When I started graduate school back in 1988, we still scanned large bound volumes of journal abstracts on a weekly basis, trying to find any new content that was relevant to our research. By the time I’d moved on to my postdoctoral position, these bound volumes were obsolete. And rightfully so! A single keyword search and I can find information from thousands of sources, delivered right to my desk, in seconds - the stuff of science fiction.

It turned out that this person, once sat down in front of the SigmaCERF ELN product and “forced” to use it for 3 days, became one of the organization’s best advocates for moving everyone to the ELN. But your mileage may vary....

One option is that if you run into someone who says they don’t even use a computer for their research, don’t bother buying a license of the ELN for them - just buy licenses for everyone else. Eventually the “old guard” will adapt or move on.

7. “We’re worried about whether or not electronic records will stand up in court.”

It’s ironic that one of the best features of a well-designed ELN is its ability to automate (and enforce) adherence to the rules and regulations required to make sure that data and intellectual property in general is in compliance and protected - and at the same time there has not (yet) been a single instance of an ELN being used to defend those records in court. That day will come, and when it does, the side that brings their ELN records to court, with their full (and automatically generated) audit trail for all of the data and documents, their fully time/date/user stamped record of all research entries, will have a clear advantage.

There have already been court cases discussing the *use of* electronic records - notably the *In Re Vee Vinhnee* Appellate Court’s discussion on the preservation and validity of

records (2005, see <http://www.lctjournal.washington.edu/Vol4/a06Offenbecher.html>), as well as *Lorraine et al v. Markel* where Judge Paul Grimm encouraged rigorous authentication means be applied to such records (2007, see http://www.lexisnexis.com/applieddiscovery/LawLibrary/whitePapers/ADI_WP_LorraineVMarkel.pdf). Note that none of these at all exclude the use of electronic records, but rather encourage proper use of them.

When it comes down to it, records, whether paper or electronic, are only as reliable and valid as the means used to make them such - and given the clear advantages ELNs have for automated documentation, encryption, and security, paper's days are numbered.

6. “The ELN is too limiting - it won't take my type of data, or freehand drawings, or...”

In the old days, ELNs *were* limited. Many of them were simply rebranded offshoots of chemistry ELNs, or poorly designed.

A modern, well-designed ELN will take *any* format of data - any file type - and if it doesn't know how to render that data itself, will rely on whatever existing tools *you* have (since you obviously already work with that content). Sometimes embedded, sometimes opened in a separate window, but *always* working with *your* data, *your* way. Dynamic and interactive, for both you *and* your readers.

Not all ELNs are well designed, so if you're not seeing the above, shop around.

5. “That won't work for us because we need it to run under OS X/Windows/Ubuntu”

This is another case of shopping around - there are plenty of ELNs for the life sciences, some are cross-platform, some aren't. The trick is finding one that meets *all* the needs of the organization - features, functions, and platforms. But they *are* out there.

4. “I don't mind seeing everyone else's notebook, but I don't want them to see mine.”

Science, as Isaac Newton once said, is done by standing “on the shoulders of giants”. It's collaborative, we build on the work of others - and the only way to do that is to let others see our work as well.

I completely understand the hesitation - everyone wants to make certain that they receive due credit for their work. I'll never forget the time I was training some new users on the SigmaCERF ELN, and one of the postdocs in the audience remarked that they would never use the system on a daily basis. When I inquired as to why, he said that he was worried that his advisor would claim his (the postdoc's) work as his own, and

that he would rather keep his paper notebook and then (laboriously) transfer everything into the ELN *after* publication.

I showed the postdoc the automatically-generated time/date/user stamp that was applied to *everything* that anyone put into the system, hoping to alleviate his fears by showing him that using the ELN was the *best possible* way of ensuring that he would receive credit for his work. He wasn't buying it.

It's unfortunate but true - you can't have it both ways. Even sophisticated ELNs that allow privacy settings and user-controlled publishing of experiments (so that you can make data available only when you are satisfied it is ready) *must* allow for peer review, in the very least by the PI or supervisor. And the work belongs to the *organization*, which is why capture of the intellectual property is crucial.

To finish the story, the postdoc's concerns are the very reason why the Rescentris ELN has the ability to control privacy and publication of data - but even in the Rescentris system the PI *always* has access to the data, even if it's hidden from the other researchers in the lab. Even paper notebooks, after all, can be gone through late at night when everyone else has gone home.

3. "We can't afford an ELN"

Okay, this one really only applies if you are still trying to convince your organization that you need to purchase an ELN. But it's still a common complaint, and one that makes almost no sense. Think about it - the research you are doing involves paying for equipment, reagents, salary time - all those R&D dollars are being poured into the research funnel to produce data.

That same data that today may live in an ephemeral, single-instance object constructed from mashed tree pulp. Sound safe? Not a chance. The only way to really protect your investment is to make sure that all of that data, every last experiment, is placed into a system where it can easily be backed up - never lost.

And then there's the problem of reinventing the wheel. Several major pharmaceutical organizations have told me that a large proportion - as much as 2/3 - of their experiments are inadvertent duplicates. That's right, they are duplicating the science - not to validate it, but because *they don't know they already have the answer*.

This can happen in several ways, actually. Maybe they truly don't know that someone else in their organization has already done that work (optimized that protocol, performed that experiment, whatever it may be). But even worse than that, what if they *know* they have the data, and they simply can't find it? Try running a keyword search on a paper notebook! But the worst of all, is knowing you have the data, finding the notebook that has the data - and then being unable to *read* the relevant entries. Coffee stains? Bad handwriting?

It seems to me like you can't afford *not* to get an ELN.

2. ***“An ELN won't save me time; I can work just as fast on paper”***

Yes. At first glance this will be true. In fact, when users are making their initial transition to an ELN, chances are it will take them slightly *longer* to record their experiments than it did with paper (depending on the learning curve of the ELN).

But there are several ways in which the ELN will *always* be faster. For example, using protocols in the paper world usually involves (a) finding the protocols binder, (b) finding a working Xerox machine, (c) remembering how to use said Xerox machine, (d) placing Xerox copy of protocol into paper notebook. Let alone (e) and (f) (returning protocols binder to the proper location, and apologizing for not having done so sooner).

We're used to this. It's how things are done. And yet there are better ways. A well designed ELN allows you to store all of your resources in a built-in document management system, so your protocols are *always* available at your fingertips - whether you are in the lab, the office, or at home - and then to easily drag and drop the protocol onto the experiment page to create a copy of it. Easy. Fast. 3 seconds instead of 10 minutes. And how many times a day - a week - a year - will you save 10 minutes? Enough to make a significant difference.

Drag and drop to create an entry, from existing content - text, images, even drag and drop content - text and images, graphs and peaks, from your scientific applications, so that your audience sees exactly what you see - and it takes *far* less time than printing and cutting and pasting with scissors. And you can be more concise and accurate at the same time, linking to journal articles and datasets that you just wouldn't bother to try to make fit into a paper notebook. All in the 3 seconds it takes to drag and drop from one application to another.

Now add on the other more obvious time-saving benefits, like searching. And legibility.

Can you keyword search your entire notebook today? How about not just your notebooks, but the notebooks of everyone working in the lab? How about everyone working in the whole organization? Or everyone that has *ever* worked there? Imagine being able to find all notes, all protocols, all the information pertaining to the work you're doing currently (or better yet - the work you were *about* to do, until you found out someone already did it for you, saving you the time and effort - isn't that the way science was supposed to work, building on the shoulders of those who've gone before us, instead of constantly reinventing the wheel?).

Now imagine that you can not only *find* all of that information, quickly and easily, from your desk - or your bench - or your backyard - but now imagine that even the notebooks written by that crazy white-haired guy down the hall are *completely legible* (even if they are still vaguely incomprehensible).

Still think paper is faster?

1. “I just plain don’t like change.”

Let’s face it, this is really the one reason that all the other reasons lead back to - we’ve come full circle. For over 200 years, paper notebooks have done *just fine* - why change now?

The fact is that science has already changed - we *need* to collaborate, to be more effective and productive if we expect to succeed (publish that paper, get that grant, patent that drug - whatever success means to your organization). But people fear that change - it’s a different way of doing things, even if it ultimately is better. Scientists are, notoriously, rebels - we do things our own way, and often ELNs are seen as a means of standardization - a perceived way of making us conform, of taking away our scientific freedom.

In truth, this isn’t necessarily the case. Yes, there are ELNs out there that don’t allow free-form entry - and in some areas this is totally appropriate. But there are other ELNs out there that allow total free-form entry of any content, while at the same time giving you the ability to then create templates from any user-generated content (as well as pre-generated forms sent down “from above”). We will *always* face change - anyone familiar with DNA sequencing technologies from even as little as ten years ago is familiar with that fact - but only the individuals and organizations that can readily embrace that change and adapt will thrive and flourish.