GETTING THE TIRE SWING

HOW PARTNERSHIP AND PROTOTYPING BUILT A BETTER ELN

For at least two decades, the tire swing illustration has epitomized the frustrations felt by project managers, developers and their customers (see Fig 1). While the cartoon highlights such factors as poor product design and customer service, it ultimately blames the project's dysfunction on one thing—failing to properly listen to customers and interpret their needs.

This blame goes two ways, though, said Stan Piper, senior scientist at Pfizer Inc, which was one of six pharmaceutical and biotechnology companies that partnered closely with Symyx in developing the core functionality in Symyx Notebook. According to Piper, organizations tend to focus on implementation or support when a product fails to meet their needs. But particularly in the case of enterprise scientific tools, such as electronic laboratory notebooks (ELNs), organizations have a responsibility to engage scientists in designing and prioritizing features and communicating those needs to vendors.

"The key really is asking scientists what they actually need and then partnering to build that core functionality into the system correctly right from the beginning, rather than giving scientists what you think they want and then hoping for good results," Piper said. Scientists, said Piper, are accustomed to receiving suboptimal solutions, and they are incredibly good at working around them. So organizations must make an effort not just to talk to scientists, but to ask the right questions in the right way. The ultimate goal is to determine both what scientists need to do, and how the ELN will facilitate them doing it.

Workshops, advisory panels, and expert user teams are essential to securing commitment and ownership from scientists. But Piper credits the approach taken in the development of Symyx Notebook with having the most impact on how the product has been received by scientists at Pfizer. Symyx employed "agile development," a philosophy that delivers many iterations of a product based on short but constant bursts of customer feedback. "We've seen many advantages in using this sort of prototyping, and the scientists have been really happy with the results delivered in Symyx Notebook 6.1," Piper said.

Scientists at Pfizer participated in three developmental stages. First, they were asked to develop a series of use cases—stories that illustrated actions they would need to perform using the ELN. Symyx then laid out these stories in simulated software screens on paper, and scientists were asked to "use" the paper prototypes to accomplish tasks while providing feedback on the experience. After refining the paper versions, Symyx created electronic prototypes and again collected feedback from scientists before releasing the official product.

"Scientists benefit from this constant feedback because they understand the direction of the development," said Piper. "They see the iterations of the product from paper through to the electronic versions and this engages them in the product and gets them excited about using it."

Fig 2 illustrates one way that user input influenced the development of Symyx Notebook. Based on user cases, Symyx developed an initial paper prototype for sample preparation that featured direct integration between the notebook and a balance to directly obtain sample weights. The prototype

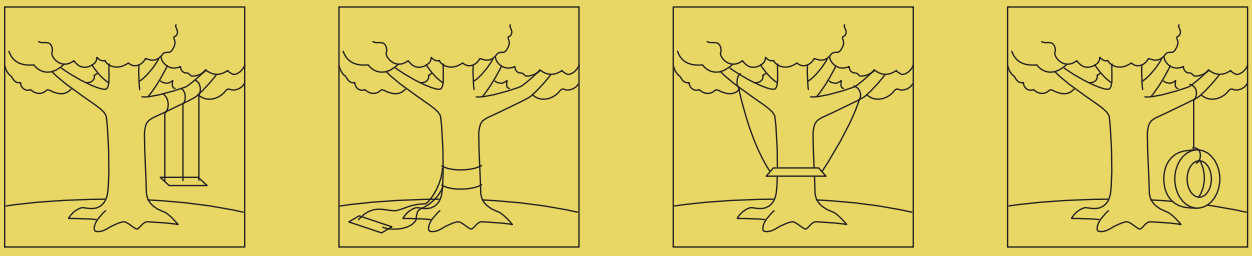


Fig 1: One version of the tire swing diagram, which was first published in *Total Quality Management* by John Oakland in 1989.

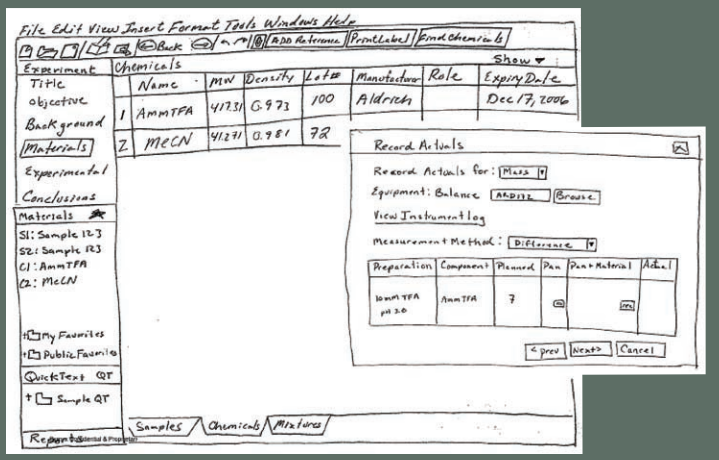
enables scientists to collect weights from one sample at a time, clicking "Next" to enter additional samples. Scientists, however, felt this process could be even simpler. They requested the ability to select samples in the materials list and collect weights with more flexibility (through batch or noncontiguous capture). This request was accommodated in Symyx Notebook by enabling scientists to enter one item or several in the dialog box shown to collect all the weights at once.

Piper noted that scientist feedback can range from global comments on data presentation ("I'd like a tabular interface to move among different types of related data") to personal preferences ("I'd like to have adjustable rulers like in Microsoft Word"). Paper prototypes, which could be quickly adjusted on-the-fly as scientists worked with them, enabled the development team to sort out which changes would be best received by the majority of scientists. The results were sometimes surprising. "Those floating dockable windows in Symyx Notebook were a small thing that the Pfizer development team never thought the users would like," Piper said. "But the scientists love it. This isn't something we would have thought to ask for, but based on the feedback, we ended up with a feature that really makes our scientists happy and that is now a part of the standard Symyx Notebook product."

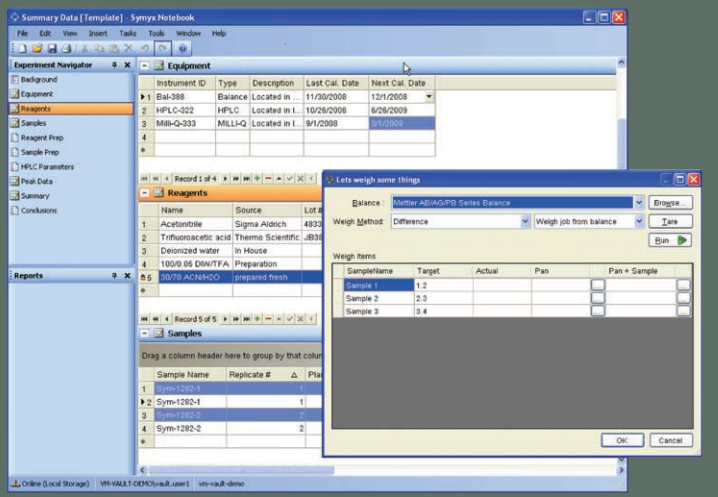
Paper prototyping also prompted discussion of additional bottlenecks, leading to the development of use cases that weren't captured in the initial efforts. For example, scientists clarified that experiment review was not always as linear a process as software developers might assume. Piper notes that many iterations of review that were easily done in a paper workflow needed to be duplicated in an electronic environment. Additionally, paper review included human interaction and communications that were missing in an electronic workflow. Communication and comment mechanisms were therefore essential elements that needed to be added to the ELN.

Agile development isn't necessarily rapid or easy, Piper pointed out. But the results build better applications and ensure that organizations avoid getting a dysfunctional tire swing.

"It's a long haul process that requires constant feedback over many iterations," Piper concluded. "The real key to all of this is identifying a software vendor who agrees on your vision of the product—which is not always as easy as it would seem—and who has the capacity to partner with a large organization effectively to build an out-of-the-box, fully supported solution. For us, Symyx was that partner." MC



BEFORE: A paper prototype for sample preparation in Symyx Notebook.



AFTER: How requests were accommodated in the software.

Fig 2: How paper prototyping was used to improve materials handling in Symyx Notebook.