

SUPPORTING FOOD AND BEVERAGE R&D WITH AN ELN

BIOVIA NOTEBOOK CASE STUDY



Research in the food and beverage industry resembles its counterpart in life science. It drives product innovation and underpins intellectual property—and consequently must be documented to support product claims, safeguard patents, and secure corporate knowledge. Yet while pharmaceutical scientists have not only widely adopted electronic lab notebooks (ELNs), but have been credited with spearheading their development, food and beverage companies have only recently begun adopting BIOVIA ELNs. It's not for lack of interest.

Challenge:

Short product lifecycles requiring requiring continuous, rapid innovation; capturing and sharing intellectual property (IP) efficiently; collaborating effectively across global sites

Solution:

BIOVIA Notebook (previously Accelrys Notebook, formerly Contur ELN)

Benefits:

- Improved research efficiency with standard protocols and streamlined reporting improving focus on science
- Better global knowledge sharing with instantly searchable/shareable/reusable IP
- Rapid global rollout/deployment and training: Less than a year! global knowledge sharing and IP awareness

Scientists in the food and beverage industry are as fed up with paper as life scientists. The process of printing out electronic data and pasting it into a lab notebook has been described by many scientists as akin to “kindergarten art projects.” Food and beverage companies also understand the benefits of storing information electronically, particularly the ability to share information rapidly across global sites. When product development time is counted in days and weeks rather than years, speedy access to what researchers have done and are doing helps organizations consistently and cost effectively deliver high-quality products that keep pace with consumer expectations.

But until recently, ELNs have been out of the reach of most food and beverage companies, which view the systems as weighed down by excess functionality geared for life science and requiring too much infrastructure and too many resources to support. “In the context of a billion dollar pharma project, it doesn’t make a difference if there are ten IT people supporting a software implementation,” said Morten Meldgaard, project director and manager of the BIOVIA Notebook implementation at Chr. Hansen, a global supplier of natural ingredients for the food, nutritional, pharmaceutical, and agricultural industries. “But that number makes a huge difference for a company like Chr. Hansen.”

Fortunately, the maturation of ELNs over the past decade has made flexible, low-resource, and easy-to-use systems available—BIOVIA Notebook perfectly suited to the demands of food and beverage companies. “We’re happy that pharma and life science invested in ELNs when they did, because all that effort has streamlined the systems and brought the overall solution cost down for the rest of us,” said Brian Carman, R&D manager and project lead for the BIOVIA implementation at Heinz.

Heinz and Chr. Hansen have implemented a BIOVIA Notebook to replace paper notebook research documentation for their global research organizations. Both organizations report that BIOVIA Notebook has increased research efficiency and supported

better global knowledge sharing and IP awareness. These benefits aren’t just the result of going electronic—the unique flexibility of the BIOVIA Notebook means that the companies have been able to roll the system out rapidly—in less than a year—across globally dispersed research centers essential to the development of new food and beverage products.

“You’d think that just by virtue of being electronic, any ELN would be better than paper,” said Carman. “But with some, you open them up and it takes 12 clicks to enter an experiment. Not with BIOVIA Notebook. You open it up, and with one click, you’re in there, capturing ideas—as easily as turning a paper notebook page.”

COOKING UP NEW PRODUCTS: WELL UNDERSTOOD INGREDIENTS, WITH A DASH OF INGENUITY

Many of the most successful food and beverage companies have at their origin a foundational innovation that launched the business and continues to inform new product development. Heinz’s first product was horseradish, sold in clear bottles to emphasize its quality; its trademark ketchup was introduced seven years after the company was founded in 1869 and was a direct outgrowth of H.J. Heinz’s insistence on fresh ingredients and flavors. Christian Ditlev Ammentorp Hansen developed a procedure for extracting rennet, a key enzyme associated with cheese making, from calves’ stomachs; this innovation led to Chr. Hansen’s founding in 1874.

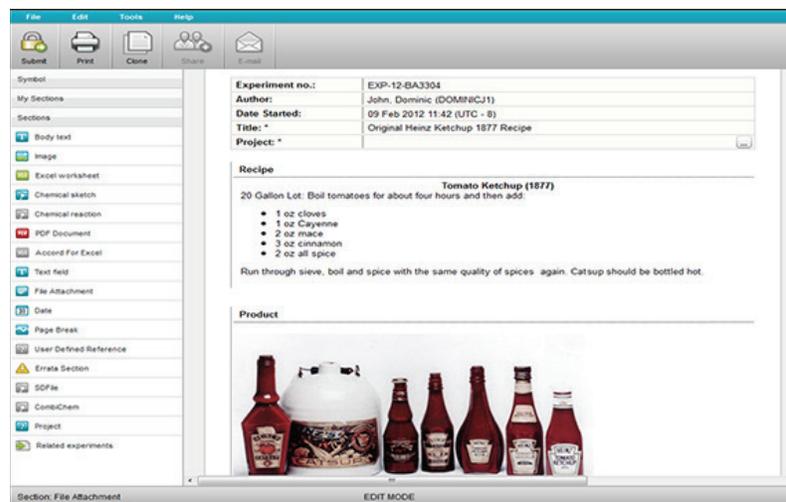


Figure 1: Heinz’s Notebook enables anyone at Heinz—chefs, food scientists, or engineers—to record new experiments or access historical data, such as the original recipe for Heinz ketchup which was introduced in 1876.

Food and beverage companies today use their foundational innovations as a base to support the continued innovation that they need to stay successful. Whether providing the products consumers buy in the grocery store or assisting external manufacturers or food service partners in developing a new hamburger sauce or yogurt flavor, food and beverage companies must find ways to turn their expertise with specific ingredients and processes into something new that

customers want. What's popular with consumers one week may change the next for reasons as divergent as the weather, a health recommendation, or a celebrity endorsement. The most successful companies are those that can capitalize on a marketplace whim—which means adopting agile systems that help them respond quickly to deliver quality products at the right time and at the right price.

"It's not uncommon for a request to come in from a food service customer for a new chili, the new chef develops the recipe in a day, a small batch is tested, and the new chili is available to the food service client by the end of the week," said Heinz's Carman. "That's how responsive we need to be. Menu change, diets change, restrictions change, and it is our job to help our customers keep up."

"Our development time is short—a few months—and the life cycle of our products is short—usually a couple of years," said Meldgaard of Chr. Hansen. Chr. Hansen conducts specific application work alongside its partners in globally located industry technology centers (ITCs). Fast product turnover and short development times generate a substantial amount of data on product concepts as they are created and tested in the ITCs. But before implementing BIOVIA Notebook, Hansen had no way to share this information among the ITCs or elsewhere in its business, because data was either locked in the pages of a paper notebook or stored in documents and spreadsheets on local servers.

Effective knowledge sharing is the main reason Heinz and Chr. Hansen wanted to shift from paper notebooks to an ELN. The ability to search experiments to see what has been done before enables every scientist to benefit from the collected wisdom of their corporate peers. Such insights can help not just with creating new products, but with troubleshooting product problems with customers; reformulating existing products to make them better, different, or cheaper to produce; or culling product concepts to focus on those most lucrative or productive.

"There's a pattern in consumer products that a lot of the same ideas are tried over and over again," said Heinz's Carman. "We want to make the information needed centrally stored and accessible to anyone through a simple search."

FINDING THE RIGHT ELN

So why move to an ELN now, given that, as Carman reported, scientists at Heinz have been documenting their research the same way Henry J. Heinz did in 1869? Because food and beverage research isn't the same as it was over 100 years ago. In an effort to improve laboratory throughput and efficiency, many food and beverage companies have invested in automation and lab instruments that generate data electronically. Ironically, this means that their scientists have had to print data out and paste it into paper lab notebooks for it to be appropriately signed and witnessed.

"It was double and triple work to document our intellectual capital," said Carman. Chr. Hansen's Meldgaard noted that it was also time consuming and a nuisance, particularly for scientists familiar with working electronically in other aspects of their business and in their personal lives. Modernizing

research documentation helps ensure that research proceeds as efficiently as other aspects of the business, which are being continually retooled so that companies can maintain a tight focus on their bottom lines. With organizations can exploit many inherent advantages that electronic systems offer over inactive paper notebooks: better quality and readability, the ability to search the system, and the ability to hold data more securely than paper.

Another factor that has enabled food and beverage companies to adopt ELNs now is the maturation of the technology. Until recently, many ELNs were made exclusively for life scientists. But research at Heinz and Chr. Hansen is diverse, occurring in fields and seed research labs where tomatoes and potatoes are bred and grown; in kitchens and dairies where recipes are developed, tested, and tasted; and in production facilities where new sauces, yogurts, and cheeses are created.

CHR. HANSEN: START SIMPLE

Chr. Hansen produces cultures, dairy enzymes, probiotics, and natural products and conducts most of its research in close partnership with its customers in globally distributed industry technology centers (ITCs). In less than a year, Chr. Hansen rolled out its ELN to 300 scientists at two centers in Germany, two in France, one in the United States, and one in Denmark. The company plans to roll out the system to several other sites, ultimately growing the user community to 350.

"The key to our success has been starting simple, making that work and getting the benefit, and then building the system out," explained Morten Meldgaard, project manager and project leader of Chr. Hansen's global implementation. After collecting a list of basic requirements for an ELN and learning about the application space, Chr. Hansen gathered a team of technicians to test four ELN contenders. "[BIOVIA] cloud-based test system was extremely valuable," said Meldgaard. "Our technicians are practical people with hands-on needs, and it really made a difference that they could work with the actual ELN in the cloud to see how it would work for them." Upon choosing the [BIOVIA Notebook], about 60 users abandoned paper notebooks completely and piloted the system. "The pilot was great," concluded Meldgaard. "It really helped us establish a robust system that we could roll out more broadly, and the pilot team members developed best practices that they could share among themselves and, later, with their peers at the official launch."

"We needed something that a chef could use, that a scientist could use, that an engineer could use, and that their managers could sign and witness," said Heinz's Carman. The BIOVIA Notebook offers a clean, Microsoft-like interface with an electronic "blank slate" that mimics a lab notebook page. Scientists work the same way they would work in a traditional

paper notebook, writing text, making graphs or images and inserting them to support claims, writing a conclusion, and moving to the next experiment. The similarity of the system to paper means that different scientists can make it their own, with only one hour of training in system mechanics. Templates can be built and shared between researchers to standardize experimental protocols or streamline reporting, but ultimately researchers decide what their notebook looks like just as they would on paper.

"Some users put in recipes, some put the system on their lab bench and collect data directly into the BIOVIA ELN, engineers use the system to document processes—there are no restrictions on how the BIOVIA ELN can be used or who can use it," said Heinz's Carman.

In addition to being easy to use, modern ELNs are also easier to implement and maintain than the ELNs of the past. ELNs developed for life science and pharmaceutical applications can take years to fully implement and require dedicated IT staffs to maintain. But this model is unacceptable to food and beverage companies, which don't have the resources or time to waste on long software implementations in areas like research that are tangential to the broader costs associated with operating the business. "We are not an IT company, so we avoid doing any systems development ourselves. We want off-the-shelf products that we can put to work right away," said Meldgaard of Chr. Hansen.

Neither company interviewed for this article took more than a year to implement its BIOVIA ELN—and that year encompasses the entire purchasing process, from evaluating solutions to rolling out the BIOVIA ELN to scientists. Both companies also appreciated the BIOVIA Notebook's openness to different hardware platforms. Finally, scientists can learn to use the BIOVIA Notebook in just one or two hours of training. "When they said we can train your scientists in 60 minutes, we didn't believe it," said Carman. "But they did. It was that easy to use."

HOW AN ELN HELPS

Efficiency is a hard thing to measure, but when steps in processes are eliminated or delays prevented, research as a whole proceeds more quickly. For instance, at Chr. Hansen, the BIOVIA ELN has sped the creation of HPLC reports. Before the BIOVIA ELN was implemented, analytical scientists had to wait to develop experimental reports until the chromatogram had run. Now, scientists simply pull up the BIOVIA ELN on the same PC that is running the HPLC analysis. "They start writing the report and when the chromatogram is ready, they capture the image, pull it into their report, and write the conclusion," said Meldgaard. "Writing these reports probably took an entire day before. Now, they are reporting information in near-real time."

Similar small efficiencies add up to big savings. For instance, at Heinz, signing and witnessing notebooks used to be so time consuming that some scientists neglected to get it done consistently. But electronic signatures have made the process easier. Automatic notifications in the BIOVIA ELN inform scientists if a selected reviewer is unavailable, so that they

can select someone different to review the notebook faster. Additionally, because the information is electronically stored, scientists can continue working while reviews occur, rather than having to wait for a physical paper notebook to be returned.

"When it comes to our overall knowledge of IP and capital, we're about 300 times better with the BIOVIA ELN than we were on paper," said Carman. "We're capturing everything from processes to tests to trip summaries in the BIOVIA ELN." Critically, the information Heinz and Chr. Hansen are capturing has more organizational value because it is searchable, shareable, reusable, and readable.

HEINZ: GETTING THE LAB INVOLVED

In addition to producing iconic global food brands such as its ubiquitous ketchup, Heinz develops specialized sauces and food items for restaurant chains and other food distributors. BIOVIA Notebook is currently used by 175 scientists at eight R&D sites in the United States, including the group's Ore-Ida® potato division in Idaho and tomato chemists and breeders in California. During 2012, Heinz plans to deploy BIOVIA Notebook at sites globally and expects the total number of users to increase to 300 scientists worldwide.

"Our scientists love the BIOVIA ELN, saying it makes their lives so much easier," said Brian Carman, R&D manager and project lead for the BIOVIA Notebook implementation at Heinz. Carman credits Heinz management for setting clear goals that mandated 100% adoption of the BIOVIA ELN and a no-tolerance policy for paper notebooks. But even with this mandate, the implementation succeeded because of the scientists who got involved to ensure the system would meet their needs. "We got scientists talking about the solution and how it helps them, and we made sure to include everyone—chefs, packagers, food scientists, and managers to work with the system and make it better," said Carman. Case in point: The implementation team developed an informal video of scientists discussing how they use BIOVIA Notebook and why they like it. "This was more powerful than any management edict," he said.

Meldgaard said that Chr. Hansen scientists used to send reports and other experimental information back and forth via email. "We don't have to do that anymore because it's all in the ELN where everyone can see it," he said. In fact, both Heinz and Chr. Hansen noted that entire experiments can now be tracked in a single notebook by linking to experimental pages created by other scientists, chefs, or engineers. "Let's say someone has developed a new process for producing bacteria," Meldgaard explained. "They'll document the fermentation steps, how to grow the culture, the optimal method to produce it—and the calculations can link directly to the results that an analytical chemist has reported in his notebook." This high level view of experimental progress has another benefit: Managers can

better track how work is proceeding in their research groups without disrupting scientists by requiring them to hand over physical paper notebooks for inspection.

In short, BIOVIA Notebook plays a key role in helping food and beverage companies develop high quality products better, faster, and more cost effectively. "Instantaneous access to all our corporate research data eliminates redundancy and enables our scientists to stay focused," concluded Heinz's Carman. "Because it's easy to check to see how and whether we've done certain things before, we can instead explore new ideas and put our scientists to work executing on those."

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