Shell Scotford overcomes culture of customization with SampleManager LIMS software in the cloud

Over 20 years ago, Shell chose Thermo Scientific™ SampleManager LIMS™ software to manage its laboratory operations and data. This deployment by all accounts was a success and a textbook example of how a Laboratory Information Management Systems (LIMS) can streamline laboratory operations and automate the transmission of quality data to the Enterprise Resource Planning (ERP) system for final product release. Like most LIMS deployments in the late 1990s, Shell customized nearly every aspect of the software to meet its specific business needs. Twenty years later, that legacy of flexing the LIMS to meet the requirements of each individual laboratory in the enterprise had caught up with them. Users were happy, since they had a LIMS that supported the unique workflow of their sites. The issue was around supportability and upgradability. Shell IT was supporting more than 20 distinct LIMS implementations. Like-for-like upgrades were increasingly difficult to complete from one version to the next. Acquiring, configuring, and maintaining hardware for each LIMS implementation was challenging. Project timelines were growing, as were project costs.

These challenges made Shell take a fresh look at the latest LIMS and infrastructure capabilities. Since its initial implementation, SampleManager LIMS software had undergone significant enhancements enabling laboratories to configure the LIMS to meet their needs instead of requiring customization. At the same time, Shell recognized that cloud technology could drastically simplify the LIMS deployment and future upgrades. Shell determined that instead of upgrading its existing system, it was time to rethink its LIMS deployment and transform its laboratory IT infrastructure.

About Shell

The Shell Group is a global group of energy and petrochemical companies that aims to meet the world's growing need for more and cleaner energy solutions in ways that are economically, environmentally and socially responsible.

The Shell Scotford Complex, located in Fort Saskatchewan Alberta, Canada, consists of a bitumen upgrader, oil refinery, chemicals plant and a carbon capture and storage (CCS) facility. It is one of North America's most efficient, modern and integrated hydrocarbon processing sites, converting oil sands bitumen into finished, marketable products.

Shell Scotford opened in 1984 with the Shell Scotford Refinery and Chemicals Plant. The Shell-operated Scotford Upgrader was expanded in 2011 and the Shell-operated Quest CCS facility was added in 2015.

Shell Scotford employs about 1,300 people. Additionally, contractors provide support for both routine operations and major maintenance activities. The number of contractors on site at any given time varies according to the type of work underway.

“The SampleManager LIMS software works great in this setup. The performance has been the same or even better than data center servers.”

– Subra (Bala) Balakrishnan, Global Program Manager

Overcoming a culture of customization

Shell’s challenges were not limited to its LIMS implementation. Like many enterprise customers, Shell was suffering from a culture of customization. With 21 years of experience leading IT projects at Shell, Global Program Manager Subra (Bala) Balakrishnan had a great perspective on the company culture when it comes to IT. “Every regional product, market, and regulatory environment is different. Everywhere we go, we would tweak our systems to meet local requirements. Our sites expected it.” This approach created a continuous cycle of IT projects for Shell’s enterprise applications, including the LIMS. Each individual site in the Shell enterprise became its own project, with resources locked up for months reviewing core code modifications and custom code, understanding how the code would be updated to work with the latest version, and how it would be tweaked to meet evolving workflows.

Further complicating matters was a changing workforce demographic and a loss of institutional memory. After 20 years, many of the creators of the custom code were in new roles. Without these resident historians, Shell had to overcome significant knowledge gaps to move these projects forward.

Shell’s IT leadership team knew the culture of customization was no longer sustainable. When the time came to upgrade to the latest version of SampleManager LIMS software, Shell decided to take a new approach.

Cloud impact

Seeking reduced total cost of ownership while providing a future-proof platform, Shell rolled out a cloud-based infrastructure for its new SampleManager LIMS software implementation. Instead of using the Shell data center, Shell chose a private Amazon Web Services (AWS) cloud to host its LIMS. “We had some people in Shell IT that, out of an abundance of caution, were hesitant to go with the cloud,” Bala recalled. “But, after the first few sites were up they realized this was the way to go.”

For Shell, the benefits of the cloud infrastructure were immediate. “The SampleManager LIMS software works great in this setup. The performance has been the same or even better than data center servers.” The cloud infrastructure has also helped simplify Shell’s upgrade process. Shell can stand up a new instance in a couple of hours, instead of waiting six weeks for a server to be ready for an upgrade. Once the cloud instance is ready, Shell hands off to the Thermo Fisher LIMS professional services team to configure the system. Moving to the cloud immediately cut six weeks from the implementation project timeline, while maintaining a high level of security with the private cloud.

Another benefit for Shell was the streamlined disaster recovery process. Prior to the cloud deployment, Shell struggled with an inefficient disaster recovery service at its data center. The process required Shell IT to raise an incident when a database or application went down. Once the severity was assessed, the team would stand up another environment and move the application stack and last database image. Shell would practice the disaster recovery drill annually at each location, spending 12 to 14 hours for each drill. The disaster recovery drills cost Shell 15 to 20 days of productivity annually.

“With AWS cloud, infrastructure is no longer a bear for us. We don’t have to wait for anything from an infrastructure perspective. It’s just there. I whole-heartedly endorse going to cloud.”

– Subra (Bala) Balakrishnan, Global Program Manager

With the cloud model, Shell is no longer subscribing to a disaster recovery service. Shell selected a multi-zone subscription for the LIMS database, which is a standard option in the AWS catalog. If one zone goes down, AWS automatically switches to the other zone. The application servers are also virtual servers, allowing quick switching during outages for routine maintenance. The cloud model is also more scalable, giving Shell the ability to quickly add CPUs, RAM, and storage when needed. “With AWS cloud, infrastructure is no longer a bear for us,” Bala concluded. “We don’t have to wait for anything from an infrastructure perspective. It’s just there. I whole-heartedly endorse going to cloud.”

Thinking inside the box

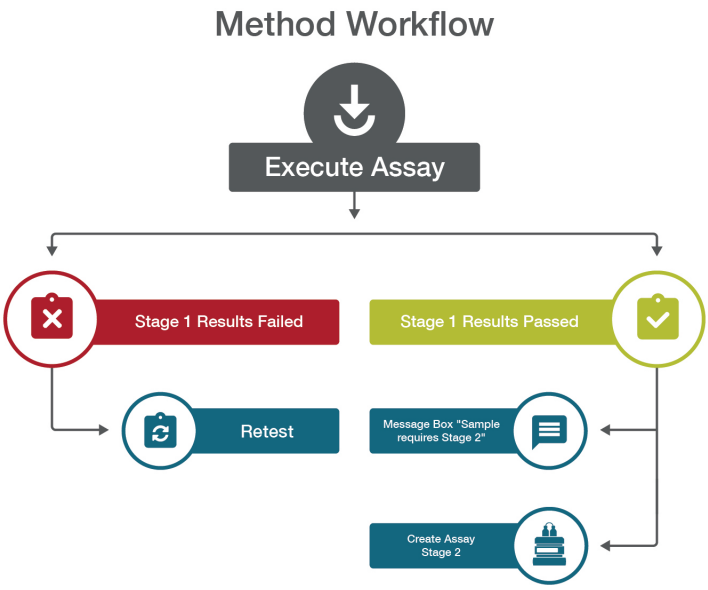
Recognizing the high cost of customization, Shell IT leadership began searching for opportunities to work more inside the box. Shell IT leadership challenged its project leads to break away from the customization model, instead using standard software configured to meet business requirements. For Bala, this edict meant working closely with Thermo Fisher Scientific and Shell site managers to configure a LIMS that could meet site requirements in a standardized way.

The goal was to create a common SampleManager LIMS software platform that could be packaged and delivered to multiple sites, without changes to core product code. A common platform would ease maintainability and lower total cost of ownership. Upgrades would be easier and completed more quickly, enabling Shell to stay on current software versions.

In 2016, Shell launched a pilot LIMS project at Fredericia. For the pilot, the team did a clean LIMS implementation. Thermo Fisher’s LIMS professional services team worked with the Shell project team to replace all custom coding from previous implementations with new SampleManager LIMS software workflows.

Workflows can execute actions using a decision tree format. For example, workflows can be configured for an assay where next steps are determined by whether the results failed or passed. Workflows can email a group of stakeholders with results, create a re-test in the event of a failure, prompt an analyst to enter information, and more.

At Shell, workflows control the entire testing process including sample collection and receiving, test execution, results entry, results verification and authorization, exception reporting, and issuance of a certificate of analysis. Shell also uses workflows to simplify the logging of samples and equipment. For example, refinery operators who log in blend headers only see test schedules that are related to a blend header. Other users who manually log in samples only see sample points available for the selected unit. These workflows make the process easier and more efficient for users, and help reduce the possibility of error.



Workflows can execute actions in a decision tree format

The entire Fredericia environment was rebuilt using standard SampleManager LIMS software configured to meet site requirements. “Workflows enabled us to stay true to the core product, using configuration options to meet site needs while providing a common system that we could share between our global sites,” Bala acknowledged.

On to Scotford

With the pilot project complete, Shell was ready to test the new SampleManager LIMS software deployment at its other sites. Shell chose its Jurong Island, Deer Park, and Scotford sites as the proving grounds for this new approach. Bala led the Scotford project team’s effort to combine two separate systems (one for the Refinery and Upgrader and another for the Chemicals lab). The team included Robert Charron, Site Focal Point for the Refinery and Upgrader, and Agnieszka (Nish) Lis, Chemicals Lab Team Lead. The project team worked with Thermo Fisher’s LIMS professional services team to roll out the new software package and identify opportunities to configure the platform to meet the combined site requirements.

One area where Shell could immediately replace customizations with configuration was in sample scheduling. Shell’s Scotford laboratories support production with objective quality measurements. Demand for this type of testing is predictable – samples are drawn from specific tanks at specific intervals. Before the upgrade, Shell Scotford depended on a highly-customized scheduling solution to complete this testing. With 70 to 80 percent of Shell’s testing driven by this solution, the business risk was high. Shell Scotford required a more standardized approach. Working with the Thermo Fisher’s LIMS professional services team, Shell replaced a complex series of templates and customizations with SampleManager LIMS software scheduler configuration and workflows.

In process industries,the scheduler ensures sampling plans are met. The scheduling software helped Shell simplify scheduling while meeting the required login workflows. With a standardized solution, Shell Scotford is now more confident in its ability to meet this mission-critical testing.

Along with scheduling improvements, Shell also benefited from the certificate of analysis functionality available in SampleManager LIMS software. Quality testing results are captured in a certificate of analysis, which is required to ship the product. Creating the certificate of analysis is mission-critical for Shell. “If we are not able to produce a quality certificate, we cannot move the product,” Bala said. “Any delays or execution errors cost the business.” Using certificate of analysis functionality, Shell built certificate templates, defining the exact data to include in the certificate for each product. The in-built limit checking capabilities help operators check results against defined standards. The workflows functionality helps Shell automate generation and distribution of the certificates. With electronic signatures, users no longer need to manually sign their certificates.

Another area where Shell Scotford could simplify was reports. Before the upgrade, Shell relied on made-to-order reports written in VGL scripting language or using Appeon InfoMaker®. Now, any reporting requirements are handled with the standard report designer. As part of the upgrade project, Shell Scotford worked with Thermo Fisher’s LIMS professional services team to train users and site administrators to create reports. “The report designer and the form designer are built using standard Microsoft® Windows® products, so they’re very familiar and similar to other software that I use,” Rob said. Using the report designer, Rob was able to create a report tracking the expiration dates of Upgrader cylinders. SampleManager LIMS software automatically logs the cylinders, and generates a color-coded report showing which cylinders are approaching expiration. Before the upgrade, Rob needed to manually query the data and use a Microsoft® Excel® spreadsheet and PivotTables to generate this information.

thermo scientific

> “We’ve seen very high interest enterprise-wide looking to replicate this model. This approach is emerging as the way to go moving forward.”
>
> – Subra (Bala) Balakrishnan, Global Program Manager

By empowering the LIMS administrators with the tools and training to create these reports, Shell Scotford has lessened the load on corporate IT to handle this work. “The biggest benefit is we build the reports ourselves, instead of waiting weeks or months for a report change,” Rob said. “When the government changes regulations and we have to update footer or header information in a report, we can make those changes quickly and comply.”

Nish added that the new administrative functions in the system enable administrators to more easily identify and resolve issues across both plants.

Keys to success

Looking back at the Shell Scotford LIMS project, Bala considered the Thermo Fisher LIMS professional services team as the key ingredient to the project’s success. The team spent time at the Scotford, Fredericia, Jurong Island, and Deer Park sites to not only build relationships, but to learn the business requirements. “These guys came in and were quick studies. They immediately understood what the customer and the lab user were saying.”

For Shell, the greatest value was the services team’s ability to map requirements to configuration options in the standard SampleManager LIMS software. The professional services team helped the Scotford site decipher years of custom coding and configure workflows to replace its custom work. “We have two labs at Scotford with very different sets of requirements and workflows,” Nish said. “The services team helped us meet these requirements using standard product, so both labs are happy and my job as an administrator is easier.”

A sustainable future

After the successful rollout of SampleManager LIMS software at Scotford, Shell anticipates a global rollout will pay dividends.

Shell IT is confident it can drastically lower the cost of future upgrades and reduce total cost of ownership, completing future LIMS upgrade projects in weeks instead of months. Staying on the latest supported version of the software means help is always a phone call away.

The new model is gaining momentum at Shell. “We’ve seen very high interest enterprise-wide looking to replicate this model,” Bala shared. “This approach is emerging as the way to go moving forward.”

Shell plans to roll out the new model to multiple sites throughout the enterprise, while continuing to push the value of configuration vs. customization for other IT projects.

Find out more at **thermofisher.com/digitalscience**

ThermoFisher SCIENTIFIC

CS80184-EN1019