Case Study

How ZEISS Predictive Service Helps the University of Lausanne Maintain Their Imaging Systems

ZEISS

Seeing beyond

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Founded as a School of Theology in the 16th century, The University of Lausanne (UNIL), Switzerland is one of the oldest universities that continues to be open to this day. Nowadays, the university has around 17,000 students and 4,000 staff members across seven faculties.

Among UNIL's many research focus areas are medicine and life and environmental sciences. Research in these fields requires the university to rely on different imaging systems, including ZEISS instruments. Employing the latest technologies helps UNIL to keep up with the state-of-the-art research in these scientific fields. Therefore, acquiring and using cutting-edge imaging instruments are a key part of the university's efforts to grow.

The challenge: ensure the highest image quality and availability

UNIL's Department of Fundamental Microbiology (DFM) uses a ZEISS LSM 980 confocal microscope for imaging. This is one of three confocal microscopes in the university and the only confocal microscope in the DFM, essential for the work of its more than a dozen research units.

Confocal microscopes have become fundamental in biological research. Compared to other imaging technologies they do not necessarily provide the highest resolution images but are highly flexible. They also benefit from simpler preparation requirements than some of the more specialized imaging techniques.

Due to the specificity of confocal microscopy, the LSM 980 is critical for the DFM. Likewise, the variety of research units and their projects within the DFM always demand operational availability. This is where ZEISS Predictive Service comes in.

While in use, Predictive Service unobtrusively collects information about the system performance in the background. Through a secure connection, relevant system data from the system´s acquisition workstation get transferred to the ZEISS Predictive Service Server. From there, engineers can look at it and diagnose the system remotely. Predictive Service sends them alerts proactively if it detects something unusual or that requires their evaluation. In this way, they can spot potential problems before the customer becomes aware of an issue.

In this case, Predictive Service warned tech support about overheating in the LSM 980's GaASP detector. Confocal microscopes use photomultiplier modules (PMTs) located at the system's scan head as photometric detectors that offer higher imaging speed and can detect light at low levels.

GaASP (Gallium Arsenide Phosphide) detectors are designed for even higher light sensitivity, especially for weak signals and red and far red fluorophores. At the same time, GaASP detectors reduce the amount of laser power applied to live samples, hence preventing their deterioration, and also provide a better signal-to-noise ratio.

If it persists, overheating in the scan head can reduce the imaging quality. Further, it can also critically damage the system and halt its usage.

The solution: troubleshooting errors with Predictive Service to prevent downtime

Upon receiving the overheating notification from Predictive Service, tech support engineers got in touch with the Department and told them about the problem. When asked if they had seen anything unusual, the system users noticed a problem with the signal-to-noise ratio falling out of the normal parameters. Decreasing signal-to-noise ratio diminishes image quality making imaging of weakly fluorescing or fine structures challenging.

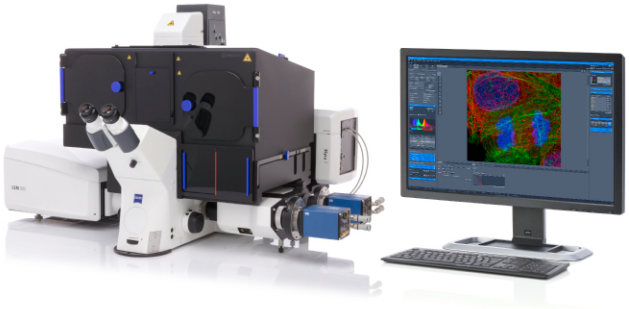

Figure 1 *ZEISS LSM 980 with Airyscan 2 and Elyra 7 dualcam on Axio Observer 7 with monitor*

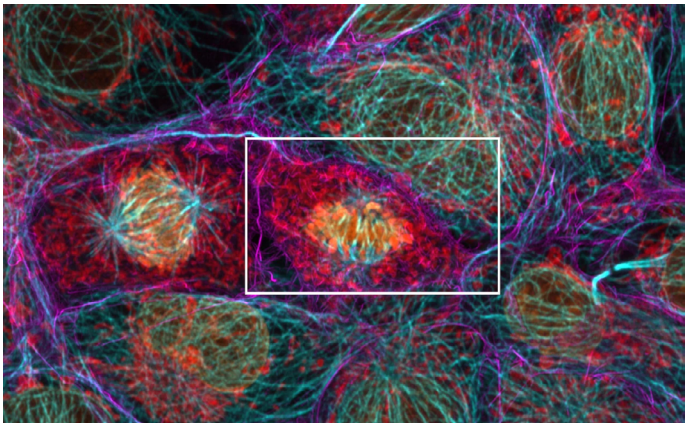

Figure 2 *Cos-7 cells Anti-TOM20 AF750 (red), Anti-Tubulin AF700 (cyan), Actin Phalloidin-OG488 (magenta), DAPI (orange). Imaged with LSM 980 with LSM Plus, including the ZEISS NIR detector in channel mode. The fluorescent signals were separated by Linear Unmixing, facilitating clear separation between the spectrally overlapping dyes Alexa 700 and Alexa 750. Sample courtesy of U. Ziegler and J. Doehner, University of Zurich, ZMB, Switzerland.*

Tech support thought at first that the source of the problem could be the room temperature. They enquired with the Department about the room conditions and asked if someone could check their air conditioning. After inspecting their air system, the department found that the room's conditioning was not working properly and needed fixing.

After the air conditioning was repaired and room returned to normal temperature, it was time to find out if the detector continued to overheat. Unfortunately, despite the room repair, the microscope continued to report overheating.

An engineer went on-site to check the system and upon inspection found that the GaASP detector cooling was defective. A new part was ordered and fitted soon after. At the change of the detector, the temperature went back to the expected values.

The customer was happy because they did not have to pay for the new part since they were under a warranty extension, part of the premium contract they have with ZEISS.

The customer was even happier because the repair was covered by their Protect Service Agreement with ZEISS. Crucially, the department's work was never put on hold during the troubleshooting and fixing process. Researchers continued to work because the engineer moved the signal to another detector, the Airyscan 2, their LSM 980's area detector. No research time was lost.

Predictive Service was also able to help tech support diagnose a problem with the room temperature system of the client, preventing other potential failures in this and any other instruments located in the same room. At the same time, during monitoring, problem diagnosing, and troubleshooting, since Predictive Service ran in the background, it did not disturb the work of the department, or the tech support engineers.

In research facilities throughout the world, Predictive Service runs as a transparent solution for remote monitoring, part of ZEISS's efforts to offer unmatched support, improve customer experience, and optimize instrument performance. Predictive Service is installed in the ZEISS microscope's acquisition workstation with the authorization of the customer during installation.

No collection or sharing of personal information and images taken by the microscope is required. Predictive Service enables performance data to be shared to ZEISS tech support engineers. Selected operational data insights are also available for Protect Service Agreement customers via the ZEISS Portal.

How Predictive Service Works:

- Predictive Service comes pre-installed on every new X-ray Microscope as well as a number of our Electron Microscopy and Light Microscopy systems. You can choose to enable it and take advantage of the benefits available, or not.
- Once connected to your network, Predictive Service will monitor the health of your system – ensuring that it is running as effectively as possible.
- System condition information is shared between your microscope and ZEISS servers via a secure connection, ensuring the highest levels of data security. No image data or research information is accessed or shared.
- Predictive Service evaluates the performance of your microscope over time to ensure your microscope runs as efficiently and consistently as possible.
- If the system behaves abnormally, ZEISS engineers are alerted, can monitor the microscope's performance remotely, and then study the analytics data to understand what needs to be rectified. All this happens whilst you continue to conduct your research uninterrupted.

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