

Case Study

How ZEISS Predictive Service Prevents Unplanned Downtime at the National University of Singapore



Seeing beyond

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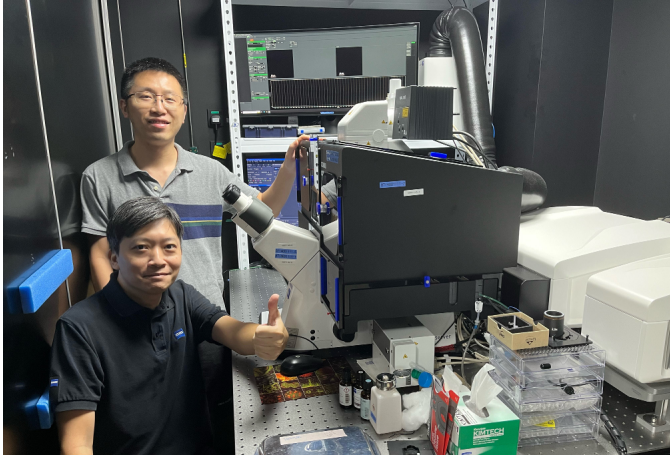


Figure 1 Photo of LSM980 with Wang Haiyang, Senior Research Fellow, Mechanobiology Institute, National University of Singapore and Eric Ma, ZEISS engineer.

The [Mechanobiology Institute \(MBI\), National University of Singapore](#) is one of [Singapore's Research Centers of Excellence](#). Founded in 2010, the MBI was conceived to promote long-term first-class scientific research in the country and encourage multidisciplinary expertise.

The MBI is a core imaging facility equipped with a vast array of microscopes and systems that the University uses to train its students. Due to its broad range of systems, MBI takes on different academic research imaging projects from various schools at the University.

Moreover, the MBI is also home to the [Singapore Microscopy and Bioimage Analysis \(SIMBA\)](#), an imaging consultancy firm, allowing it to provide imaging services and training for private companies in addition to its teaching and academic research.

The challenge: diagnosing overheating to prevent downtime

Without interrupting the user, [ZEISS Predictive Service](#) constantly checks the instruments' state and shares certain operational data securely with ZEISS, allowing support engineers to remotely monitor the system. In addition, Predictive Service pre-emptively alerts support teams when instruments begin to show critical values. While these instruments may not yet be malfunctioning, responding to early alerts can prevent instruments from unexpectedly failing.

In this case, Predictive Service sent two alerts from one of

the microscopes in the MBI facility. These were related to the [ZEISS LSM 980](#) confocal microscope which shipped with Predictive Service pre-installed.

The microscope's scanhead had overheated twice. Specifically, Predictive Service had recorded two temperature spikes, both of which were above the recommended operating temperature. Confocal microscopes such as the LSM 980 use a scanhead to collect the photons from the sample that will make the final images. If these overheating spikes occur regularly, the system is likely to start displaying poor-quality or high-noise images. If not dealt with, over the long-term overheating can permanently damage the instrument.

Once a notification is received, ZEISS Technical Supports conducts remote diagnosis to triage the reported fault from Predictive Service. If possible and with the user's permission, the remote team will also resolve the fault by logging into the system. If required, the team will then book in an engineer to visit the facility.

Upon visiting the instrument and reviewing it firsthand, overheating didn't come as a surprise to tech support. As it turned out, the overheating microscope had been placed in one big room alongside many other instruments. While this room was initially built for a smaller number of instruments, ten years later it was home to many more instruments than initially built for.

Engineers didn't take long to understand the impact that the accumulation of instruments was having on the room's temperature. Engineers also noticed that the room had a centralized ventilation system with one temperature set for all the instruments. In other words, it was impossible to control the temperature effectively for each instrument, including this overheating microscope.

"The alarm kept us informed about the system status while no one was in the lab. We had the chance to spot irregularities with the constant monitoring. We believe this feature provides great help to keep the good health of the system."

- Liu Jun, Laboratory Executive at Singapore Microscopy and Bioimage Analysis (SIMBA – MBI/NUS)



Figure 2 LSM 980 with Airyscan 2 and Elyra 7 dualcam on Axio Observer 7.

The solution: using Predictive Service, ZEISS advises the facility on best practices

The engineers found that the temperature of the scanhead went back to normal after one hour from the spike, so they discarded the theory that overheating could be due to pushing the system with significant, long-term usage. After examining the instrument and the room, engineers consulted with the facility manager, concluding that the layout of the room, alongside the universal ventilation system, was responsible for the overheating.

The ZEISS engineers let the facility know that the centralized temperature control was most likely the root cause, advising they change the layout. It was necessary to provide more room for each instrument or move the LSM 980 to a new, isolated location with a dedicated ventilation system.

The facility was impressed with the support provided and the engineers' recommendations. From the moment Predictive Service warned about overheating, through to the visit and final diagnosis, the system was never once shut down. As such, unplanned downtime was avoided.

At the same time, the facility was happy that Predictive Service was able to detect a cause of failure in its early stages before manifesting and becoming a larger issue affecting other researchers and their instruments. For microscope users, every minute, every hour of uptime counts, and they appreciate a system that ensures no interruptions.

The facility was also pleasantly surprised by the fact that they could use Predictive Service to monitor their instrument's performance themselves. The facility was so pleased by this fact that it began talks to upgrade one of their older confocal microscope to a second LSM 980.

With Predictive Service, if the system starts behaving unusually, remote engineers will attempt to diagnose and fix the issue prior to any visit being made. In this way, Predictive Service works as an extra hand when tech support communicates with the customer, acting as a tool for troubleshooting when receiving a call.

Predictive Service is equally welcomed by industrial organisations and academic institutes alike. ZEISS appreciates the need for top-class security protections to ensure the sanctity of sensitive microscope data. To match their security and privacy requirements to the highest standards, Predictive Service follows data security best practices.

For example, the communication between the instrument's workstation and the ZEISS Enterprise Server takes place over HTTPS. Additionally, Predictive Service does not collect any personal or image data, and only ZEISS support engineers are authorized to access the instrument's data. ZEISS stores the data on Microsoft Azure Cloud and, for ensuring privacy, it anonymizes all sensitive data.

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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