It's seven o'clock on a Wednesday morning, and things are still quiet at the Siemens Uptime Service Center (USC) in Erlangen, Germany. But that can change in a second. All of the fault reports and queries from customers throughout Germany who have Siemens medical equipment are processed and collated here, and there are around 41,000 such systems. Worldwide, Siemens monitors roughly 200,000 medical systems ranging from CT scanners to MR and PET diagnostic systems.

providing prompt processing of customer queries, preventive maintenance, and rapid resolution of fault reports.

If a customer experiences problems or simply has a query, he or she can contact the Uptime Service Center around the clock. An expert at the center will go online (frequently even during the same telephone call), log into the customer's network, and initiate a diagnostic process. This functionality requires the system to be connected to the Siemens Remote

24/7 Solution. In up to 50 percent of the faults reported worldwide, the problem can be fixed by the USC and therefore eliminated remotely. If this is not possible, Siemens experts have access to a spare parts catalogue and can order any part that may be required without delay. In 97 percent of all cases, the customer has the part on the very next day — worldwide. In particularly urgent situations, for example in the event of a total failure, the required components can be sent immediately by

Today, the diagnosis and ordering of spare parts by the remote service team takes place within about 30 minutes. Should on-site service be required, most of the engineering call-outs for the next day can be planned online, and in around three quarters of all cases the fault can be eliminated during an engineer's first visit.

The platform for this online access and remote maintenance service is provided by SRS (*Pictures of the Future*, Spring 2005). Siemens specialists from the USC use a reliable IT infrastructure based on a securely-encrypted VPN (Virtual Private Network) connection to connect directly to the system and the customer. "It is like a central forum where service engineers and customers exchange information with each other," says Head of Product Support Dr. Stefan Henkel.
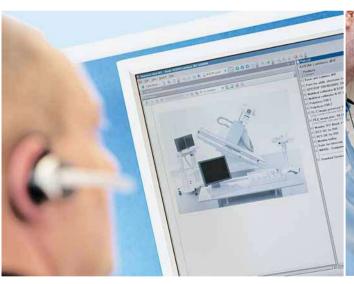
Certified Data Protection. At Siemens Remote Service, data security is considered to be of supreme importance — as it should be, given the fact that "we are dealing with highly

services, including virus protection — a particularly important feature since more and more clinical equipment is integrated into network systems. This integration has considerable advantages. For instance, using a panel at the patient's bedside, the attending physician can call up patient-related data stored in a central database (*Pictures of the Future*, Spring 2008, p. 70) or transmit images from a computer tomograph to a digital patient file at the press of a button, immediately after they have been taken.

Virus Hunt. Damage inflicted by viruses can severely compromise a hospital's operations — for instance by causing a system crash with significant associated delays, by putting emergency patients at risk, or by losing vital data. This is why the radiology department at Switzerland's University Hospital Basel chose a comprehensive VP solution in 2007.

The hospital records more than 10,000 digital patient images a day, a figure that requires some 18 gigabytes and is nevertheless steadily increasing. What's more, the facility's imaging

Indefatigable Guardians

When it comes to medical technology, equipment reliability and availability are indispensable. To guarantee uninterrupted service, Siemens offers an innovative remote-maintenance concept that makes it possible to detect and eliminate faults — often before they cause any problems.

With its remote maintenance centers and software updates, Siemens can eliminate up to 50 percent of the faults in large-scale medical equipment worldwide via data networks.

As is so often the case, there are peak hours with particularly intense bursts of activity. "In Germany alone, we processed more than 100,000 reports in 2008," recalls Arne Westphal, who heads the USC.

In most countries where it is represented, Siemens has established Uptime Service Centers to support international customers in their own national languages.

Together with its Regional Support Center and Headquarters Support Center, which specializes in unusual and complex problems, the Uptime Service Centers form the Siemens customer support network that is responsible for

Service (SRS). After entering the customer's system ID, the Siemens expert will be looking at the same screen content that a service engineer would see.

Without interrupting the operation of the device, the Siemens expert first looks at the log files and the entries that provide any information about the location of the fault. In the case of a magnetic resonance scanner, for example, he may look for problems that occur when sliding the table in, or coils that may have been incorrectly connected by the customer that would cause signal interference and thus image degradation.

taxi — and in areas that are difficult to access, for instance the mountains of Canada, even helicopters can be chartered. At the same time, the USC will inform a local engineer and simultaneously dispatch him with the spare part to the customer.

Things weren't always this easy. Only a few years ago, around two hours after a report was received, an engineer would arrive at the customer site and it would take another hour for the diagnosis to be completed. Only then were spare parts ordered. Yet another visit was required for the actual repair. As a result, extensive down time were often experienced.

sensitive patient information," says Michael Püschel, head of the System Management Center for Siemens' Healthcare Sector, which provides the infrastructure. "It is precisely at this critical point where sensitive data and networked systems come together that Siemens offers maximum security," he adds. This is confirmed by TÜV Süd, a certification organization, which has certified that the center's information security management system is in compliance with the ISO 27001 international standard.

The possibilities that SRS offers have enabled Siemens to develop further innovative

These functions certainly boost the effectiveness of a hospital's workflows in terms of time and labor requirements. But they also bring with them a spectrum of risks that every computer user is familiar with — risks that range from USB sticks containing data downloaded from the Internet, and growing numbers of viruses, worms and Trojans that can penetrate and damage systems.

To combat this problem, Siemens has developed Virus Protection (VP), a scanning program that prevents hostile attacks by detecting bit sequences that are typical of viruses and blocking them before they can be activated.

systems operate at full capacity, which is why all systems must be available for use at all times in order for workflows to proceed smoothly.

To ensure the highest level of data security, as well as seamless operation, the Siemens Service Center not only monitors hospital systems, but works closely with the customer. Every hospital employee is required to report any irregularities. Siemens uses an extensively tested and proven virus scanner from Trend Micro. The product can continuously monitor electronic systems without interfering with the hospital's processes. The product is also pre-

ventively and constantly updated with information regarding the latest virus signatures, which are tested in advance for relevance and compatibility with the imaging system in question. "This makes it possible to minimize risks with little effort on the part of the hospital," says Christian Kluth, head of Medicine and Operational Technology at University Hospital Basel.

Built-in Brains. For particularly important equipment that requires the highest possible level of system availability — for instance in the context of interventional cardiology or emergency computer tomography — Siemens offers an additional level of proactive service: the Guardian Program.

Around the clock and in real time, this system monitors key device parameters including the functionality of X-ray tubes in angiography systems, the temperature and flow speed of coolant in magnetic resonance tomographs, and the rotation speed and vibration of computer tomographs.

The number of parameters to be monitored varies tremendously depending on the system being monitored. It is not unusual for 100 or even 200 threshold values to be monitored individually or in correlation with one another. Such values are pre-defined by Siemens device engineers during the device's pilot phase, and are constantly checked.

As soon as one of these values exceeds or falls short of its set limits, this is registered online. "The systems have their own intelligence," explains Püschel, who is an expert in machine pattern analysis. "They automatically tell us if there are indications of a possible fault."

Employees at the Siemens Service Center can then respond promptly and, under ideal circumstances, eliminate the fault directly in the system — before device users have noticed any sign of a problem.

In a recent development, this has also become possible for X-ray tubes in computed tomography scanners from the Somatom Definition family. TubeGuard, an additional option to the Guardian Program, provides problem-free patient images around the clock. More than ten sensors monitor tube functions, ensuring that deviations can be spotted and reported via data transfer through SRS before problems actually occur.

And TubeGuard is just one of many recent service innovations from Siemens. According to SRS Product Support head Henkel, further innovative services are already in the pipeline, because, as he says, "the service development process never stops."

■ *Stephanie Lackerschmid*