YOUR TRUSTED PARTNER
FOR WORKFLOW MANAGEMENT
IN RADIOLOGY

20 YEARS OF
EXPERIENCE

CUSTOMER
FEEDBACK
Do you want to optimise the workflows in your radiology in order to sustainably guarantee a quick and safe diagnosis? Do you want an organisational infrastructure that reliably supports and efficiently accelerates your report management? Would you like to reduce the efforts for administration and controlling to a minimum in order to be able to focus completely on the essentials in the remaining time - the diagnosis and the treatment of your patients?

medavis workflow solutions optimise the whole radiological workflow - from appointment scheduling to billing. At one and the same time, you can increase economic efficiency and improve patient care. medavis uses sophisticated interface technology so that the solutions fit seamlessly into your system landscape. Whether you are connecting your modalities via DICOM across interfaces for PACS, HIS and therapy systems, communicating with web or mail servers medavis ensures that the digital information flows freely in your radiology. Your previous investments are protected. medavis gives you a broad spectrum of ways of designing an efficient radiological workflow. Our solutions are consistently geared to the needs of our users. The system incorporates a sophisticated understanding of the various roles involved so that predefined roles are available for any area of activity. Before start up, every user is carefully trained for live work with the system right from the start. To enable rapid, high-quality diagnostics, all your resources are used to the full in each individual work step in a manner consistent with your particular circumstances. medavis software solutions are a byword for reliability and top-quality performance. They are modular, scalable and grow to keep pace with your developing needs. If the conditions of your radiology alter, your medavis solution can always be adapted flexibly to meet the new demands.

Reading the testimonials of our medavis users will convince you.
Perfect workflow management - reliable and effective
Modern radiology departments face rising demand for their services: throughout Europe, the number of scans performed increases each year. Patients expect to be seen more quickly, and to have more say in their own treatment. At the same time, there is pressure – particularly among publicly funded services – to provide a more efficient service, doing more for less. Hospitals are finding that they can meet increased expectations through more intelligent use of technology.

AZ Sint-Lucas Hospital, based in the Belgian city of Ghent, is a good example. With 805 beds and 70,000 patients admitted a year, it is also typical of the modern hospital. Its busy radiology department, employing 15 radiologists, carries out 140,236 examinations annually, with the number rising each year.

In 2008, the radiology department decided to move from film-based processes to a digital system. It installed a Picture and Archiving Communication System from Merge, and a RADIOLOGY INFORMATION SYSTEM (RIS) from medavis. The aim was to provide a more patient-centric service and to minimise waste and inefficiency.

Dr. Adelard De Backer, head of radiology, says that the medavis RIS appealed for a number of reasons. A key factor was its ability to integrate with other healthcare systems, such as the Hospital Information System and the Electronic Patient Record System.

"RIS is a very important tool in the radiology department because it crosses the whole of the workflow," he says. "It was essential that it could integrate with other systems, especially the Picture Archiving and Communications System (PACS). The medavis RIS was the best at fulfilling all the requirements we needed at the time to develop a digital workflow." The medavis RIS uses the HL7 and DICOM protocols to connect to other systems, and it is now “integrated deeply into our workflow.”

The surging number of scans and scan appointments is a challenge across Europe. Many hospitals have different systems for archiving and sharing images, communicating with primary care professionals, storing patient records, making appointments and managing billing. The AZ Sint-Lucas hospital in Belgium has simplified this set-up with a single RADIOLOGY INFORMATION SYSTEM that connects all of these together: medavis RIS.
into the digital workflow of the hospital”, says Dr. De Backer. Not only that, but the RIS feeds information and medical reports into a local distribution platform serving general practitioners, improving the efficiency and reliability of communication between the hospital and primary care.

The RIS’s powerful BILLING functionality was also a very strong point in its favour. “In Belgium, the billing process is characterised by a lot of rules which we have to follow very closely,” explains Dr. De Backer.

Although the number of yearly examinations has increased each year since the initial implementation, the radiology department hasn’t needed to recruit extra staff because the medavis RIS has improved efficiency, and the initial outlay has already been paid back. When they make an appointment for a patient, staff know how long the examination will take, and this enables them to create a worklist that minimises the time in the waiting room, resulting in greater patient satisfaction. “We now have a standardised workflow. Everybody knows how to perform a standard examination, how to make an appointment and how to bill it in the worklist,” he says. The RIS has been extended into additional departments such as cardiology and nuclear medicine. Its flexibility has enabled the workflow to be adjusted to the specific requirements of the individual departments. Although the quality and functionality were the key selling points of the RIS, Dr. De Backer says he has also been impressed by a strong client/customer partnership. He attributes the smooth implementation of the system to the large amount of preparation medavis did beforehand, consulting with healthcare, finance and IT staff to develop a good understanding of what was needed.

Within a few weeks, radiology staff were using the RIS without difficulty. The RIS has been very stable but, if there are technical issues, Dr. De Backer reports that they have always been resolved quickly – a single point of contact in the medavis technical support team responds to questions in a timely fashion. […] While it may be difficult to predict some future trends in healthcare, the ongoing demand for radiology services is unlikely to change. A 2012 Department of Health report cited data which showed the number of CT and MRI scans carried out for the NHS has increased threefold in the last 10 years. Others have reported that the number of some common imaging tests shows an average increase of up to 15 per cent every year. It is clear, then, that hospitals must have strong systems to help meet this demand. As the experiences of staff at AZ Sint-Lucas Hospital […] show, smarter use of technology may be one important solution.

**Facts & Figures**
- Hospital Radiology
- 805 Beds
- 70,000 Patients/year
- ca. 140,000 Examinations/year
The Merian Iselin Clinic in Basel is a cutting-edge, patient-centric private clinic with a public mandate. The clinic specializes in orthopaedic operations. What sets the clinic apart is the fact that around 90% of these are performed by attending physicians. There are also permanent nursing staff, physicians and admin staff, who take care of the smooth, everyday running of the clinic, communication with referring physicians – in Merian Iselin Clinic’s case this is typically the attending physicians themselves – and patient care. Around 25,000 radiological examinations are performed every year. The clinic relies on cutting-edge Information Technology to ensure the availability of all relevant medical patient data.

Swayed by Product, Service and improved Workflow

When the old RADIOLOGY INFORMATION SYSTEM (RIS) was to be replaced in 2012, the clinic decided to go with medavis. “We evaluated all of the popular RIS solutions,” recalls Dr. med. Thomas Egelhof, chief physician of the Radiology Institute of Merian Iselin Clinic. According to Dr. Egelhof, medavis were chosen “because their product appeared to suit us, because the software seemed to be intuitive and easy to use, met all of our requirements, was based on the latest software and server architecture, they were known for their outstanding level of service and the company was prepared to implement an interface to our own Hospital Information System (HIS).” Christoph Kreutner, Head of Technology at the Radiology Institute, adds: “The RIS met other requirements as well: it streamlined the workflow and we were impressed by its robust speech recognition with good functionality and by the integration of accounting as a fixed component of the RIS.”

Intuitive Operation, Statistics as well as a Comprehensive Overview of a Patient’s Medical History make Life easier

In the two years during which Merian Iselin Clinic has been using the medavis RIS, the users have come to really appreciate some of the features that make their lives so much easier. Dr. Egelhof is full of praise for the RIS, which he says is “very straightforward, simplifies the workflow, has a highly intuitive user interface and generates statistics about our capacity, waiting times and turnover without any problems at all.” Kreutner is especially enthusiastic about the use of the DIAGNOSTIC PATIENT CENTER, a function which provides anytime access to a patient’s entire history from all the key workstations. “It’s an absolute first,” says Kreutner. “We’ve not seen such an elegant solution, which is always part of the screen, from any other vendor.”

Another key feature, says Dr. Egelhof, is the ability to “look at examinations in advance, which means we can see what’s required and already assign an examination to a specific physician and if need be also make any changes to the standard examination protocol. No other vendor offered this function.” According to users, the ability to integrate one or more images into the report is another key feature. “The referring physicians appreciate the fact that all of the information is in one document, which makes their and our work easier,” says Kreutner.

Seamless Migration a ”memorable Experience”

medavis rose to the major challenge of migrating data from 2007 to the end of 2012 into the new RIS. Kreutner explains: “When we switched on the medavis RIS that afternoon in December 2012, we kept the old RIS running in the background just in case, so we
could always switch back. But it proved unnecessary, we were able to work seamlessly with the new RIS from day one, with no disruptions and no need to go back to the old system. It was a memorable experience for us.” According to Kreutner, the vendor’s flexibility was crucial to the successful migration of the data: “medavis had the right people with us at the right time, and they were incredibly flexible in terms of the schedule. Training, which was organised in small groups of four in parallel to ongoing operation of the system, also proved very successful, and the well thought out menus are user-friendly and allow for straightforward learning on the job.”

medavis allows for better Use of Resources
The medavis RIS has made life easier for the staff of Merian Iselin Clinic. This has been reflected, for instance, in the significant drop in the number of inquiries from insurers, the reduced pressure on IT support staff and the cut in the time it takes to create reports: “We have fewer discrepancies and losses in our accounting, because were now able to maintain much better control overall. Previously, each employee would work directly in the accounting program, whereas now each member of staff documents only the activities, without having anything to do with the accounting program, and only two dedicated employees are responsible for actual accounting,” says Kreutner. Because accounting is now much more precise, “I only have inquiries from insurers maybe once or twice a month instead of every day,” says Dr. Egelhof.

He also says that the robust speech recognition functionality, which is used in conjunction with a medavis word processing module integrated into the software, has greatly increased efficiency. “The system no longer crashes during dictation.” Kreutner adds that the stability of the system means that the IT support team are now under much less pressure. Whereas system crashes used to be dealt with by merging reports manually, which was very time-consuming, “now there is almost no need to intervene manually, and the reports now leave us much more quickly than before and I can use my time more productively elsewhere,” says Kreutner.

Asynchronous Connection to HIS prevents Loss of Data
The RIS at Merian Iselin features essential interfaces to the Picture Archiving and Communications System (PACS) and to the hospital and accounting system. In the event that the interface to the hospital is down, be it owing to scheduled maintenance or to unforeseen events, no data are lost as a result, because medavis has had the foresight to implement the data connection bidirectionally and asynchronously: “Even if the hospital system is down, the interface created by medavis is designed to transfer the data asynchronously at a later point in time so that no data are lost,” explains Dr. Egelhof.

Exceeds all Expectations
Merian Iselin Clinic is absolutely delighted with both the product and its vendor. “All our expectations have been exceeded, the system works very well, is stable, and never lets us down,” says Dr. Egelhof. “It is regarded as very user-friendly.” The impact the system has had on the workflow and the general work atmosphere has been positive, he says: “At the front end the registration team works more efficiently, while at the back end statistics which enable us to identify trends are now directly available online. Generally, staff satisfaction has increased. The implementation of a single system has eliminated the hectic approach brought about by working with two systems.”

medavis in it for the long Haul
As long as the product, service and partnership are solid and the quarterly software updates are practical extensions as opposed to cosmetic fixes, then users are likely to be happy and the working relationship will undoubtedly be a long-term one: “Our partnership with medavis is very forward-looking,” says Dr. Egelhof. “The support is excellent,” he continues, “rarely are there any problems, and if we do need help, we can count on access to competent staff. We are extremely happy, the product and service are excellent, you are taken seriously as a customer and we have a very solid partnership with medavis.” Unlike with large companies, there is contact at all levels, from support through to management. And as far as the decision to implement the medavis RIS is concerned, Dr. Egelhof says: “We couldn’t do without this product, which is now a cornerstone of our workflows, and we would do the same again.”

Facts & Figures
- Hospital Radiology
- Specialist Clinic for Orthopedics and Surgery
- ca. 25,000 Examinations/year
- HIS and Billing Integration
- INTEGRATED SPEECH RECOGNITION

Merian Iselin Klinik für Orthopädie und Chirurgie
Föhrenstr. 2 • 4009 Basel • Switzerland
Tel.: +41 61 305 13-00 • info.radiologie@merianiselin.ch
More and more Radiologies rely on medavis RIS for future Sustainability

Five German imaging centers in the Munich area jointly decided to introduce medavis RIS in the summer of 2012. Coordinated by Anyserve GmbH, a regional IT service provider for radiologies, medavis RIS was installed at 17 sites altogether from December 2012 to May 2013. The first system went live at the seven sites of Radiologicum München on December 1st 2012, followed by another system start each month at the other four radiologies: Herrsching (then 1, now 3 sites), Prinzregentenplatz (4 sites), München Zentrum (2 sites) and Diagnosticum Bayern Mitte (then 3, now 7 sites).

Increase in Efficiency due to digital Speech Recognition

The reason for switching to a new RIS was the dissatisfaction of the radiologists with the previous solution, especially the lack of digital speech recognition. Many products were evaluated during an extensive selection process. The medavis RIS finally convinced everyone involved due to its efficient workflow management along with deeply integrated speech recognition and its future sustainability. The greatest challenge for the project team was to consider the specific requirements of each imaging center within a very short timeframe. For appointment scheduling, it was decided to play it safe - the appointments were entered in both systems for two months before the system start. Consequently, all appointments were available in the new scheduler right after the system start. Therefore, the institutes were prepared for all eventualities and all system starts went smoothly without downtime – in all cases, all sites of the same imaging center went live on the same day. The collaboration of the project team, consisting of project managers from medavis, Anyserve and each of the imaging centers, was excellent. A careful workflow analysis conducted beforehand made sure that all aspects were taken into account. The former workflow was compared to future possibilities.

"By introducing the new software, we were able to professionalise, optimise and rationalise our workflows. By unburdening our medical team, we can now focus again more closely on the most important thing, the optimal service for our patients."

Dr. med. M. Röttinger radiologicum münchen
Medical partner

"By introducing medavis RIS we could improve efficiency and productivity of all processes and all participants involved. This is particularly true for the physician’s core process of creating reports due to the introduction of integrated speech recognition. In addition, we were able to optimise process transparency and processing times and carry out the service entry earlier and with less effort. The medavis RIS also made it possible for us to take a significant step towards a paperless imaging center and offering demand-oriented services and workflows to our patients and referrers."

Dr. med. Thomas Hilbertz Radiologie am Prinzregentenplatz
Medical partner

The medavis project manager explained the functionality of the medavis software in detail to the team, so that the requirements of all imaging centers could be taken into account in a perfectly adjusted way. Anton-Richard Jaman, CEO of Anyserve: “The medavis project manager, who really had a lot of experience, always asked the appropriate questions and kept track of all issues at all times.” Thanks to an open communication and a clear comparison of the old and the new system, the team was aware of the expected changes from the beginning. Anton-Richard Jaman: “We ran through the workflow several times. The medavis project manager always explained exactly how the product works. What is possible and what is not. Of course it is impossible to not make any changes at all. However, thanks to the open communication with medavis, everything worked out just fine.”

Sophisticated interface know-how is one of medavis’ strong suits. No matter on which subjects
a question came up – on the HL7 connection to the four different PACS systems or the connection to over 100 modalities via DICOM modality worklist – the experienced medavis project manager always had the appropriate solution for each problem. And thanks to the specialists at medavis, the data migration went smoothly as well. All previous reports from the old system are now available to the physicians in medavis RIS - an important aspect for diagnostic security. Mr. Jaman: “Personally, I liked that our contact person had a vast knowledge in all relevant areas, especially concerning the interfaces.” Already after a short operating period, all participants realised that the desired workflow optimisations had been achieved with medavis RIS as the leading system. All workflow steps were standardised as far as possible in order to benefit from synergies and increase efficiency sustainably. Report creation in particular was made easier and quicker. By using the latest speech recognition software, the typists had free capacities and could take over other functions. The standardised RIS now enables a cross-site appointment scheduling and evaluation at all imaging centers. If a physician alternates between two different sites, his personal workstation settings are available without changes at any workstation, e.g. for using speech recognition. In addition, medavis RIS offers a large number of optimised statistics that can be configured individually to conduct analysis across sites, thus allowing radiology administrators to quickly identify measures to further improve workflow and efficiency. All of Anyserve's clients opted for a central architecture - the server for all sites is located at the main site respectively. Due to the excellent infrastructure in Munich, all sites have a transmission rate of at least 100 Mbit/s. This makes consultations with colleagues for a second opinion possible across sites in just seconds. Also, all connections are fail-safe.

Sustainability thanks to optimised Workflows

The joint implementation of medavis RIS generated many synergy effects. Due to the intensive information exchange among the five imaging centers, different workflows could be compared and questioned. Before entering the master data, e.g. the examination ID codes, all methods used up to now were compared and the most future-proof method was picked; but not without scope for possible enhancements. The information exchange was a benefit for planning user trainings as well. According to the motto “The more training, the better the system start”, the medavis trainer trained key users on site in Munich for 5 to 15 days per institute. Afterwards, the knowledge of these key users was passed on to all users at each imaging center internally. The trainings were carried out more or less in parallel to daily operations. At the Radiologicum, a training room with 10 workstations was set up especially for this purpose. All users could get acquainted with the new software on a medavis test database and practise the new workflows themselves. Thus, everyone already had the required knowledge at the time the system went live.

“We have been using a speech recognition system for years, but nevertheless we could shorten our reporting times due to the fully INTEGRATED SPEECH RECOGNITION in medavis RIS. In addition, the workflow for our physicians has been further improved due to the DIAGNOSTIC PATIENT CENTER, because important previous reports can be viewed at all times - even while writing a report. The workflow is now significantly more efficient in other areas as well, thus leading to shorter patient passthrough times. Thanks to the good project preparation, the system could go live during normal daily operations.”

Dr. med. Rudolf Conrad
Diagnosticum Bayern Mitte
Medical partner

High User-Satisfaction and faster Reporting

When asked about the user satisfaction today, almost 2 years after the system start, Mr. Jaman says: “The level of satisfaction is high. The most important issue for our radiologists was speech recognition. By using speech recognition, the time until a report is released is now consider-
ably shorter than previously. We would opt for medavis again. The medavis RIS is being developed innovatively. We are on good terms with the medavis team.” Any new integration that occurred in the meantime always went smoothly – no matter if new sites were connected or a new PACS was installed at one client site. The Anyserve GmbH currently provides support for about 350 medavis RIS workstations in the Munich area with direct connection to more than 100 modalities and the complete IT and telecommunications infrastructure in the respective imaging centers.

That the decision for medavis had set the course for a sustainable solution has already proven to be true for the owners of Anyserve GmbH. A framework agreement was signed with medavis.

“By introducing medavis RIS with INTEGRATED SPEECH RECOGNITION and a PACS connection, our evaluation workflow improved significantly, but other areas were also enhanced and are organised more clearly now. The collaboration with Anyserve and medavis during the installation and introduction of the new systems went very reliably and structured. The combination of the current software and services of medavis and Anyserve respectively fulfilled our requirements to a high degree.”

Dr. med. Christian Teusch
Radiologie Herrsching
Medical partner
For the past 16 years, the imaging center München-Nord, Germany, has been working with the RADIOLOGY INFORMATION SYSTEM from medavis. The users are experienced and the digital workflow runs stably. The holder did not opt for a check-up in spite of this, but especially because of it. All processes from registration to reporting and billing, master data and hardware are thoroughly checked. Experienced workflow experts of the software provider analyse if the users use all possibilities the current software offers during their daily work routine. Hidden potentials, that save time and costs, are discovered and made available for the users in the different workflow steps. “From time to time you have to check the habits you have grown fond of,” Dr. Gerhart Dürr, one of the holders, explains.

Not long ago, the joint imaging center that specialises in neurological radiology and surgery and also cares for the patients in the day clinic in Northern Munich has run through a check up analysis by medavis. “Many things work well, but some processes could be optimised,” Dr. Dürr sums up the result. This starts already at the registration: alone by separating personal appointment scheduling (at the registration desk) from telephone service (in another room), efficiency and customer satisfaction can be increased.

The analysis also found optimisation potential in the area of material management. As an intelligent tool, medavis RIS can give suggestions which contrast agents have been used for which examination. Diligence is rewarded: If the master data are meticulously maintained, the service entry works almost automatically and items of service will not be forgotten. You have to pay close attention to assigning material to examinations, so that you don’t lose time with the manual search.

Optimisation potential was also found in the billing process. For private patients an automatical bank data import can not only save valuable time, but also avoid transfer errors. For NHI patients the physician tags can be assigned automatically if the data are entered correctly.

In general Dr. Dürr and his colleagues are very satisfied with the medavis system. “The handling is good in every aspect; it is clear and can be used smoothly and many functions are self-explanatory.” The medavis support service also received a good ranking. “You can quickly find a contact person that responds to our special demands.” After the check-up, the imaging center is not left alone with the improvement suggestions. The doctors and their employees learn how to implement them in a training offered by medavis. Dr. Dürr expects that the check up quickly pays its dividends. “During the transition process, the changes cost time for a brief interval, but then we will benefit from the results,” is his firm conviction. “Every redundant work step should be eliminated.” He is sure of his employees’ support: “Simplifications are always accepted gladly.”
The Darmstadt Clinic is a maximum-care hospital of high importance in South Hessen, Germany. The academic teaching hospital for Frankfurt/Main and Heidelberg-Mannheim medical faculties employs 2,500 staff, has 1,160 beds and cares for over 37,000 patients a year. It offers all the usual methods of interventional radiological treatment and carries out around 90,000 radiological examinations per year. The clinic has two main sites in Darmstadt, in the city centre and in the borough of Eberstadt. Most of the radiological work is done in the city centre, from where other facilities are also looked after using teleradiology.

Darmstadt Clinic – a Pioneer
The decision to implement a RIS back in 1999 marked the Darmstadt Clinic out as a pioneer. It was a decision driven by “a combination of progressive thinking, security and workflow issues – essentially the same reasons for investing in a RIS today,” says Alexander Steinmetz of the radiology department of the Darmstadt Clinic. At the time, the clinic already possessed a Hospital Information System (HIS), which was programmed by the IT department. It required an interface to transfer the DICOM worklists to the large medical devices, guaranteeing greater security for patients.

“To begin with this interface was also programmed internally, but the result wasn’t perfect, because the solution was ultimately flawed and not easy to operate. Even then we were carrying out a relatively large number of examinations each day, so we wanted a system capable of uniquely assigning reports to patients and preventing images from being mixed up. As inherent progressive thinkers, we believed that the way forward was to implement a RIS for managing examinations and creating reports,” says Steinmetz.

medavis – a Reliable Partner, not least in Terms of Interfaces
“The biggest challenge, then as now, was the issue of interfaces,” Steinmetz freely admits. “Given that there are always new requirements that have to be taken into account, for instance buying equipment or a new HIS, it’s a constant battle to make sure that all of the interfaces are working properly.” Although the Darmstadt radiology department handles most of the day-to-day challenges, such as importing new examinations, either on its own or in collaboration with the internal IT department, they appreciate that they have a reliable partner in medavis: “If we want to improve something, we often work together with medavis. We
are in close contact with the medavis interface developers,” affirms Steinmetz.

The Darmstadt Clinic knows exactly where it stands with medavis, which also comes from the vendor’s continuity of staff: “We are in contact with medavis on many levels, and I call with questions or comments about twice a month. I appreciate the familiarity which results from having the same person answer my calls pretty much every time. They know who I am and can put me through or call me back. We’ve built up a relationship of trust over the years.”

Innovations are embraced
“Being a radiologist you are always an innovator in one form or another, that is to say you are always purchasing new equipment, and that brings with it new technical challenges. For instance, when we invested in our PET/CT in 2014, we encountered new interface problems.” This is why it’s so important for a RIS vendor to continually develop its product, in order to keep up with medical and technical innovations.

Steinmetz: “Progress made in medicine means, for example, that kidney function is no longer measured based on creatinine levels, but is determined by the GFR (Glomerular Filtration Rate). This is now built into the software and features in the latest version of the medavis RIS; so the medavis RIS is continually developing, in collaboration with its users, in order to keep in step with changes,” says Steinmetz. Optimising the workflow by introducing speech recognition has also had a “positive effect on our report turnaround times and on the level of satisfaction among referring physicians,” he continues.

RIS Functions make Life easier
The ability to create personal worklists is a feature that assistant physicians like to use to document the necessary examinations. It increases transparency across the examinations that are carried out. Steinmetz: “For example, whatever the physicians on night duty do is documented, or anything of an interventional nature can be traced back during the day shift. This type of documentation is also important in the context of further training, because to become a specialist, assistant physicians need to prove that they have performed a sufficient number of different radiological examinations. And further training plays an important role for the Darmstadt Clinic.”

Steinmetz goes on to mention other benefits of the medavis RIS: “I think the Diagnostic Patient Centre is great, because you can see a patient’s history at a glance in the report. Another advantage is that the worklist lets you show the HIS and RIS data, which means you can always see the name and phone number of the person making the request. I also like the text block function. Blocks of text can be logically linked to the examination to be specified, that was something new to me. This all accelerates the workflow enormously. We also use the mail function of the medavis RIS a lot and the statistics function is extremely helpful. I wouldn’t do without either of them.” And another plus, says Steinmetz, is that: “The RIS is extremely robust. We really couldn’t be happier.”

Facts & Figures
• Hospital Radiology
• 1,160 Beds
• ca. 2,500 Employees
• Teaching Hospital
• ca. 90,000 Examinations/year
• HIS Integration
• INTEGRATED SPEECH RECOGNITION
Cross-regional medical Network facilitates Patients’ Access to latest state of the art Diagnosis and Treatment Procedures

As early as in 1959, the Klinik Dr. Hancken, which was founded 10 years before, concluded its first cooperation contract with the municipal clinic in Stade, Germany. Now in its third generation, the clinic closely combines outpatient with inpatient treatment, a trend-setting concept in healthcare today. According to their needs, patients are treated by the same doctor both as outpatients in the medical service centre and as inpatients in the clinic. In addition to an own medical day care clinic with 50 beds, six other hospitals in the area are part of the group.

In 2013 the clinic decided to implement a standardised RIS at all sites. Mr. Brenk, IT Project Manager at the Klinik Dr. Hancken said: “The central appointment scheduling was especially important for us. If no appointment is available at a requested site, we wanted to be able to directly offer an appointment at another site.” Patients are supposed to benefit from the excellent equipment of the medical service centre that operates on a cross-regional level and offers state of the art diagnosis and treatment procedures that can otherwise only be found in specialised clinics in larger cities. For example, one of the two most advanced PET CT devices is available there since February 2013. It sets new standards in diagnostics and can detect even the smallest tumours. Due to the wide variety of services available within a networked group, the IT infrastructure grew heterogeneously. At the seven sites, two different RIS systems, one HIS, an additional ward information system and a radiotherapy information system were in use. Support and maintenance of this complex IT infrastructure was both time-consuming and expensive. In case of a dysfunction, it was difficult to find the error.

By introducing medavis RIS at all sites, the former system with three databases could be consolidated into one central system with up to 250 RIS workstations and four HIS interfaces. All external sites are connected to a central, high-performance server via broadband lines with a transmission rate of 100 Mbit/s. All 400 users have direct access to medavis RIS and all patient data. If there are no appointments available at one site, an examination can easily be scheduled at another site.

Another benefit is that analysing information across sites is easily accomplished due to the central medavis RIS database. Thus, the growing demand for statistics can be met quickly and easily. Mr. Brenk: “We can now easily access radiological and nuclear medical information from a single RIS and compile statistics across all sites from one database.”

The implementation posed two big challenges for the
organisation: Firstly, the different systems had to be consolidated on a technical level in medavis RIS. Secondly, about 400 users had to become acquainted with the new system.

In order to increase efficiency in each process step, medavis RIS is consistently workflow-oriented and based upon sophisticated user role models. Initially, users had to review their previous working methods and internalize the new ones. An important prerequisite for this was comprehensive on-site visits. Each department was visited and employees were interviewed on their specific requirements. According to Mr. Brenk, each day invested into this project preparatory phase paid off during the implementation phase. Only if the requirements of each user group are known, the workflow and the training concept can be adapted precisely to these individual needs. This is an important basis for the users’ willingness to handle their daily work and get accustomed to a new system at the same time. The on-site visits were practically combined with training sessions. All users were trained in dedicated groups - from registration to nuclear medicine, technicians, physicians, typists and billing staff. Mr. Brenk: “The medavis training concept is a great merit. All users were provided with a manual beforehand. Thus everyone already had some knowledge at the time of the training and was able to ask specific questions.” Training the staff was a huge challenge. Up to four medavis trainers trained for several weeks on site. A pleasant side effect: Users personally know their future contact persons from the very beginning, as most of medavis’ trainers also work as support staff, thus providing an optimal foundation for a good cooperation in the future. The roll-out for all seven sites took only 5 months - from October 2013 until February 2014. The final system conversion at each site was done during one working day respectively. Mr. Brenk: “There was not a single day of delay during the whole process, we could meet all deadlines.”

With the introduction of a uniform RIS, system stability has been improved and error finding and debugging has been made easier. The medavis Agent also saves time and expenses. This software distribution tool ensures that updates as well as software enhancements are installed automatically. Thus the IT administration effort is reduced significantly. In order to prevent system downtimes, virtualisation was made a priority from the start. The medavis RIS was virtualised on Xen and the complete system is running in a SAN. This guarantees that a second device will be activated if one device fails. The workflow will continue smoothly without users noticing the incident.

In addition, medavis redundancy provides a double safety net, i.e. the RIS database is backed up on a medavis server. In case of an error, the medavis backup can be used to restore data. At the Klinik Dr. Hancken, the decision for medavis would be made again anytime. Mr. Brenk: “I strongly believe that medavis RIS is the best product on the market.” The reliability and expertise of the medavis staff as well as the performance of the software solution has convinced both management and employees. The clinic’s management particularly appreciates the flexibility of the medavis employees, who always come up with a pragmatic solution to every question raised.

Facts & Figures
- Hospital Radiology
- Specialist Clinic and MCC
- 7 Locations
- ca. 250 RIS Workstations
- ca. 400 Users
- 4 HIS Integrations
As reliable as ever

“We’ve been using the medavis RIS for over 12 years, and we couldn’t imagine working without it now. In all the years it has never once let us down,” says Dr. Labisch, radiologist and person responsible for image archiving and communication systems at Radiologie Herne. Back then it was important to select a product capable of fulfilling technical and medical requirements and whose vendor was able to interact with and create a close working relationship with its customers. This was the reason for choosing medavis, a medium-sized, owner-managed company.

Key Criteria

The decision to replace the DOS-based practice management system was what prompted implementation of the RIS in 2002. The new system was primarily intended to simplify the documentation workflow. What sounds like a simple task today was a milestone back then, because up to that point there had been no word processing system, no templates for automatic service entry and billing and no way of being able to parallel retrieve reports and images. Plus the new system would also have to be able to store patient and referral data. From a technical perspective, the availability of standardised interfaces (HL7) was a key criterion for the choice of the medavis RIS. Even in 2002, data had to be transferred from a hospital which used Radiologie Herne as an external service provider. With other hospitals soon to follow, interoperability was crucial.

Going digital

Fast forward to 2015, these requirements have been well and truly standardised. Today’s agenda includes multimodality and process orientation. Dr. Labisch: “Any treatment involves a multitude of data. The patient arrives with documents, there are more forms to fill out with us, we generate new images with our modalities, to which reports have to be created. These documents all contain information which is required by various staff during the course of the treatment. Too much time would be wasted collecting and the required information would no doubt end up lost on somebody’s desk if it wasn’t available immediately and centrally in the RIS.” Whether referral forms, external images, reports and preliminary reports, admission or patient information sheets, every kind of document is now being digitised at Radiologie Herne. To simplify this, a barcode system for automatic scanning was also integrated. The medavis RIS MULTIMEDIA ARCHIVE with integrated scan functionality efficiently manages all kinds of documents (paper, CD) and a sophisticated image archive (PACS) is also connected to the RIS. To streamline the documentation workflow even further, speech recognition was introduced in 2005. Because of its high level of interoperability, the medavis RIS makes it easy to work intuitively throughout the entire treatment process.
**Vital Functionality**

“If we still had to carry paper from A to B, we would be less efficient and less productive,” says Dr. Labisch, summing up the result of the collaboration with medavis. All data are available in the central DIAGNOSTIC PATIENT CENTER of the medavis RIS from the four sites of Radiologie Herne. This is a prerequisite for working across sites. Based on their user roles, which are managed with Windows, staff are able to access all documents and files from any one of the four sites. It is not uncommon for a second opinion to be provided in real time by a specialist at one of the other facilities. Data are transferred at a rate of 100 Mbit/s. All documents are available to staff at any time, instantly and with no loss of data. Consequently, waiting and treatment times for patients have been reduced. From an organisational perspective, the beauty is also that multiple workflows can be triggered in parallel. For instance, a service can be billed and an additional examination scheduled at the same time.

Besides the advantages on the healthcare side, the RIS also offers vital features for the management team. Individual process steps can be evaluated and their cost-effectiveness can be analysed. Optimising the workflow has allowed each individual step to be performed more quickly. For instance, introducing the medavis RIS has resulted in a reduction in the average report creation time from 48 to 26 hours. Further figures can be used for quality assurance purposes, with regular assessments being made in the context of ISO certification.

For a RIS to effectively support and facilitate the day-to-day work of physicians, radiographers and admin staff, it has to be used intensively. “The medavis RIS is very intuitive. Even temporary staff or colleagues joining us from the hospital are able to operate the main functions and work with the system after 30 minutes,” praises Dr. Labisch.

**Ongoing Development**

Whenever new features are introduced, medavis always involves the users, “because their acceptance is crucial to the system improving our work.” For any new feature there is a joint process analysis to discuss the challenges staff face at work and what can be done to overcome them.

Because new features often result in a change to the usual way of working, medavis regularly invites users to training sessions. The purpose is to gain acceptance of new features and to make sure they are used. The vendor introduces the new features and can benefit from any feedback from the staff.

**Always available**

“The software must benefit the user. With medavis, this is something which works very well,” says Dr. Labisch, commenting on the friendly, almost familial relationship between Radiologie Herne and the vendor’s employees. The decision to go with a medium-sized, owner-managed company for the central software has proven to be absolutely the right one. The excellent working relationship has enabled ideas and requests to be channelled into product development. The result has been a stable IT solution with the RIS at its heart, a system which runs seamlessly and which has been accepted by the users. With the exception of updates, which are announced in advance and generally take about 30 minutes to install, the system has not had any downtimes for over 12 years. Dr. Labisch: “There are still a lot of documents to be digitised. But medavis is a reliable partner who supports us tirelessly.”
High Treatment Quality guaranteed

As supra-regional joint imaging center, the Radiologie Wittlich in the hospital Bern- kastel/Wittlich and the Maria-Hilf hospital in Daun secure the radiological out- and inpatient care for patients of the Trier region, Germany. With six specialists, four assistant physicians, a team of about 70 employees, modern diagnostics and a RADIOLOGY INFORMATION SYSTEM (RIS) that accompanies the workflow intuitively, the imaging center guarantees a high treatment quality and also economically efficient health care.

Workflow Management on the highest Level
For a smooth workflow in the imaging center, the responsible people of the supra-regional joint imaging center Wittlich decided in 2007 to exchange the simple imaging center management system for an expert solution for the radiology workflow management. The continued growth lead to new requirements in the daily work and a relocation provided the opportunity of a clean slate, the chief physicians from Wittlich Dr. Günther Reinheimer, Dr. Alfred Simon, Dr. Alexander Stölben and Dr. Dirk Lommel and their employees started with newly equipped treatment rooms, new PCs and a new software on 1 October 2007. Michael Lüpke, imaging center manager and IT administrator, remembers: “It was a jump into the deep end for all of us. The users were trained to use the new system three or four weeks before go live, but they worked with the old system until September 30th.” Therefore the tension was high. “Working with medavis RIS however, went smoothly from day one. Only few things had to be changed, which is an indication for me how important it is to select a provider with experience and real interest for the customer,” Michael Lüpke describes a reason why they selected medavis back then. In addition to the know how of the service provider, the presentation of the product at reference customers and the answers in a very extensive target specification were other reasons for selecting this provider. “For us it is not sufficient to connect RIS to PACS and the modalities, as we provide all services for the regional network hospital and, as a self-sufficient external radiology, the site Maria Hilf in Daun.” “We needed a communication to the HOSPITAL INFORMATION SYSTEM (HIS) that maps the workflows beyond our imaging center and a provider willing to implement and put these interfaces into operation as general contractor with all involved companies. We found this provider in medavis.”

Requirement: Clean Data Transfer
During the change to RIS and the development of IT infrastructures and for the physicians work, a clean data transfer between all connected systems is essential.

This is why the legacy data transfer was done meticulously in 2007. The HIS connection turned out to be very complex. “We decided that it is not goal-oriented to transfer each message from HIS to RIS,
but it is beneficial to give RIS the leading role for patient documentation. As we are an external radiology department that is integrated into the hospital, errors a hospital employee makes are transferred from HIS to RIS and to PACS,” Mr. Lüpke describes a concern he is confronted with regularly. A topic just as sensible was the connection to PACS. In order to guarantee a secure RIS-PACS communication, we tidied up initially. As the PACS contained records with PACS ID, patient IDs of the old patient management system and patient IDs of the new RIS, there were many duplicates. Before the interface started operation, we corrected this. “Today the HL7 communication between RIS and PACS works smoothly. We do not have to document changes in PACS again,” Mr. Lüpke is happy as the change was evidently worth it.

Matter of Course in Daily Business
As challenging as the RIS introduction and support on the administrative side sometimes is, as simply can the application be used in the imaging center: “The continuous mapping of the workflow accounts for the quality of the system and the satisfaction of the users,” states Mr. Lüpke “Our employees recognised the potential of the system very quickly and enjoy using the functions, as it rapidly became clear, that the workflow was quicker and more efficient with medavis RIS.” Digital dictation was an essential step to more efficiency. “The users enjoy these advantages and the freedom in their work, also across locations.” The central RIS installation connects the sites. The organisation of the tasks via worklists works so smoothly, that holiday replacements or emergency service simply work.

“As we have a very good typing pool, the speech recognition was not a topic for a long time, but today some users now use this possibility,” the IT expert adds. He is content, that physicians, radiographers and the administration work intensively with the patient records and everything that comes in as paper, is scanned and digitalised.

High User Satisfaction
“Our users are completely satisfied with the system.” Due to regular visits of medavis employees, the work of the users in the imaging center with RIS is improved continuously. Mr. Lüpke is aware of his role as IT system administrator when collaborating with the support: “In many imaging centers, the users talk directly to the support. In our imaging center, I am the link between employees and medavis support and can solve almost 80 percent of user problems on my own.” After eight years of collaboration, the decision for the medium-sized company proved to be the right one. “We appreciate the personal support. We know the medavis employees and have established a good relationship. This is an essential argument for medavis. “As the experiences in the last years were very positive, the system runs stably and the communication with other systems works well, the imaging center would again decide in favour of medavis.”

“Working with medavis RIS however, went smoothly from day one.”

Michael Lüpke
Imaging center Manager and IT Administrator
Radiology Wittlich
**Optimal Connection improves Care and Referrer Retention**

Report transmission upon report release? Dr. Roland Scheck and his colleagues from the Radiology Oberland in Bavaria/Southern Germany offer this excellent service to their referrers and patients. Via the portal4med REFERRER PORTAL of the RIS provider medavis from Karlsruhe, Dr. Scheck and 14 other radiologists exchange reports and images independent of the site in high quality with their referring colleagues. In the hospital Agatharied and the Atrium Health Care Center Holzkirchen every year about 100,000 patients are evaluated for the colleagues in the connected hospital or the doctors with their own imaging center in the region.

**Automatic Upload of Reports and Images**

“We have been working with the RADIOLOGY INFORMATION SYSTEM (RIS) of the company medavis since 1998 and have digitalised the internal processes from the orders to the reminders without gaps,” describes Dr. Roland Scheck, one of the four holders and responsible for the IT daily business in the Radiology Oberland. “With the portal4med referrer portal we offer the referring colleagues the possibility to directly access reports and images of their patients.” Dr. Scheck has been using the new medavis REFERRER PORTAL since December 2015 and is extremely satisfied with the new solution. Each referrer with portal access can access the reports and images relevant for him. The assignment of a patient to a referrer is done by Dr. Scheck via RIS. Via single and group login he has control that the referring party (one physician or a team) have access to the respective patient. “The referrer details are already kept in RIS, the administration is very easy. I generate the password for the colleagues of the complete joint imaging center and make it available,” Dr. Scheck explains. The workflow for him and his own team has not changed much due to the data exchange via portal. When a report is released and the referrer is not registered in the portal, the report is sent by fax or a CD is burned and sent as before. For the referrers registered in the portal, the documents are automatically uploaded and are immediately available online - without time loss and media disruption.

**Referrers are enthusiastic about the integrated Image Viewer**

On demand, the referrer receives an e-mail as soon as new reports and images arrive in the portal. It’s his decision how the patient details are listed: sorted by date, the current cases first or for joint imaging centers by responsible physician. He can determine both the order of the columns and the displayed patients individually. The doctor can quickly and easily find the respective patient record via the search that works very similar to a search engine. The referrers were especially enthusiastic about the integrated image viewer that can be used to view images directly in the portal. “The display is of course not on PACS level, but the possibilities are impressive,” Dr. Scheck explains. “The referring colleague can drag complete series in the viewer in seconds and view them. Images of all methods, MRI, CT, ultrasound, etc. can be displayed without restrictions in excellent quality. The brightness of images and series can be changed with one click. By scrolling, the referrer can navigate through a CT examination. Zoom in and out and display different images next to each other - everything is possible,” Dr. Scheck summarises this bonus as representative for his referrers. Additionally, an event protocol registers who had access to which data at what time to guarantee an optimal tracing.
IT Connectivity thought through

The evaluation speed at the two sites of the radiology Oberland is about one hour, the maximum is two hours. This was attained by the consequent digitalisation and intensive use of RIS functions. “You simply see that the system was originally developed by a radiologist. The understanding for the needs of an imaging center still remains today,” Dr. Scheck justifies the high trust in the provider medavis and the longstanding cooperation. In addition to evaluation, appointment scheduling and billing - in close digital coordination between registration and radiographer - are also controlled through RIS. As the communication takes place completely digitally, the connection to the outside was a logical next step for Dr. Scheck: “Many colleagues, e.g. orthopedists stop offering conventional x-ray, as it is not financially feasible anymore. For them and also others, mostly specialists with a high IT affinity, connection beyond practice borders is the best alternative,” the expert gives his opinion. “The aspirations of IT connectivity in Germany amount to networking the service providers and exchanging data. A lot is happening in this field, but currently, the exchange is restricted to reports, lab values and medication plans and the images were forgotten. That’s why the medavis portal4med is such a good possibility to close this gap,” the radiologist concludes. Analogous to the basic concept of the social media to “share information”, portal4med creates the conditions for a better and quicker communication of the physicians. “You could call it networking between physicians with the goal to exchange information or get second opinions for better patient treatment,” Dr. Scheck describes. “The patient of course must give his consent beforehand. In the system you can also configure how long you want to share the patient data with a colleague.” Dr. Scheck is convinced that patients benefit from the connected medicine. “Imagine you tear your meniscus during a skiing vacation, but have already been operated on the cruciate ligament. As an administrator, I can give the colleague on-site guest access to the images. He only needs a web-enabled device and can then view the images.” By an optimal communication beyond the borders of the radiology, the modern IT medicine creates the basis for a quicker and better therapy of the patients.

“The referring colleague can drag complete series in the viewer in seconds and view them ...”

says Dr. med. Roland Scheck, specialist for radiological diagnosis, Radiology Oberland, Germany

---

Radiologie Oberland
im Krankenhaus Agatharied
Norbert-Kerkel-Platz • 83734 Hausham • Germany
Contact person: Dr. med. Roland Scheck
Tel.: +49 8026 38 96 00 • E-Mail: info@radiologie-oberland.de
Internet: www.radiologie-oberland.de

Facts & Figures
• Imaging Center
• 2 Locations, 1 in Hospital
• portal4med REFFERER PORTAL
The physicians, medical-technological radiology assistants (MTRA) and admin staff at the three sites of the Gemeinschaftspraxis für Radiologie und Nuklearmedizin Ravensburg (clinic for radiology and nuclear medicine) all work digitally. Since 2001 they have been using the RADIOLOGY INFORMATION SYSTEM (RIS) from medavis, which interfaces with all modalities as well as the Picture Archiving and Communications System (PACS) and archive. Alongside the benefits of better medical interpretation of digitally created and evaluated images, the physicians and staff appreciate the value of an IT-based workflow. Further improvements have also been made since the integration of speech recognition in 2014.

From Index Cards to a fully integrated IT Solution
The physicians of the radiology department of the Ravensburg clinic work in an almost paperless environment. This was something they never would have envisaged back in 2001, when they decided to introduce the medavis RIS. The intention was to facilitate the admin of patient data and digitise accounting. The system proved so intuitive that users were very quickly able to use other features, for example to schedule treatments or simplify documentation. Technical details of examinations were subsequently incorporated into the documentation and all modalities, such as CT, MRT, scintigraphy and ultrasound, as well as the digital image archive (PACS), were quickly integrated.

Today, both physicians and patients benefit from the medavis RIS. The use of digital imaging technology provides physicians with more detailed information for the evaluation of images and the radiation dose for patients can be reduced. The ability to retrieve information from any location means that second opinions can be provided in real time, reducing the duration of treatment.

Integrated Speech Recognition improves Cost-Effectiveness
Once all the data had been digitised, the RIS offered further possibilities for optimisation. "We wanted to accelerate the reporting workflow," says Dr. Lothar Keller of the radiology department at Ravensburg, and also responsible for IT within the department. For this reason, a decision was made to ditch digital dictation in favor of speech recognition. When physicians used to dictate onto cassette, the typists would type the dictations into the RIS and add them to the physicians’ worklists for approval. The physicians would then, if necessary, make any corrections and approve the text. The report or admission note would then be dispatched. The introduction of digital dictation a few years later streamlined the process, but it would still take several hours from start to finish, even if a dictation was prioritised. "We also look after inpatients, and our colleagues at the clinic expect the report as soon as the examination is finished. To enable this, we introduced speech recognition," says Dr. Keller. No sooner said than done; a speech recognition solution...
The deep integration of speech recognition into the RIS is integral to a seamless workflow. Physicians dictate directly into the familiar interface of the medavis RIS and at the same time they can see the image they are evaluating as well as the text they are dictating into their dictation device. Physicians can decide themselves when they want to correct errors or approve and send the text. Thanks to a good basic vocabulary provided by the vendor and additions by the clinic prior to the introduction of speech recognition, user acceptance was ensured, because the system made so few errors.

**High Flexibility of medavis RIS**

The advantage of adding speech recognition to the medavis RIS is that new words can be added easily to the vocabulary, and in Version 7 the accuracy trainer is much improved. The physician can decide when to trigger a correction and what the administrator is allowed to edit and add to the vocabulary. “We have a lot of creative users. Thanks to them, the vocabulary is growing. But it isn’t just our colleagues who are creative and put our IT to the test,” smiles Dr. Keller. “When one of our users spoke the term ‘Kleinhirnhemisphären’, the speech recognition system didn’t understand at first and proposed ‘kleine Hemisphären’.”

But it isn’t just in terms of speech recognition where the RIS is flexible. The physicians and staff work at different sites. They stand in for and help each other out when specialised knowledge is required. From any workstation they can access their own individual user profile, which is managed in the medavis RIS. The system runs on a central server. A 45 Mbit/s connection ensures quick response times, despite central installation. The advantage of working like this is that the features of the RIS, such as group worklists, are used intensively. “Colleagues interpret images for other colleagues if they have time. We do this in cases where the patient is not looked after by someone from our imaging center, but by a colleague at the clinic. And reporting from a central worklist also saves us time in the context of working with referring physicians,” says Dr. Keller.

According to Dr. Keller, these functions of the RIS are used so intensively because it is so easy to customise the system. The RIS is so flexible it can be adapted to individual workflows and requirements. Which is why there are rarely any support queries from users. Minor issues can be handled by Dr. Keller himself, and for anything more technical he can easily turn to the staff at medavis. “It’s nice to have access to such a competent team on the vendor’s side,” he smiles.

**Greater Success together**

“My colleagues and staff also value the medavis RIS because it is so stable and never lets them down. Interfaces to other systems and modalities are also seamless.” Thanks to the synergies created by the partnership, speech recognition could also be integrated without a hitch. All expectations were met, despite Dr. Keller’s initial skepticism. “Given the huge impact of speech recognition on the familiar workflow, I was concerned that not everyone would be compliant. I was positively surprised. The training was good and everyone embraced the change. The biggest ‘objector’ initially now helps me out with the skeptics,” smiles Dr. Keller.

Buoyed by the success among colleagues in-house, Dr. Keller now has his sights set on the referring physicians for 2015. His intention is to create a joint, digital time and appointment management system, and he is optimistic: “What has worked well with the RIS internally will also work with our external colleagues.”
Highest Quality due to the Correct RIS
The experienced team of radiologist and physicians specialised in the field nuclear medicine of the imaging center Franken-Hohenlohe place great importance to a high-quality radiological and nuclear medical diagnostic on the basis of current device technology. For the physicians quality signifies short waiting times, the best possible therapy and smooth collaboration with external colleagues. This is why the team with 9 members cooperates with referrers and the inpatient care hospitals in the region - the hospitals in Öhringen and Künzelsau and the Vulpius clinic in Bad Rappenau. In order to better organise the cooperation between the four sites in Neckarsulm, Öhringen, Künzelsau and Bad Rappenau, we invested in the IT by installing medavis RIS in 2015. “With our simple and DOS based system we could no longer fulfill the demands of a modern imaging center”, Jörg Marz, partner in the imaging center and responsible for the computer systems and the use of medical devices, supports this step. “In addition to my work as physician, it is my job to ensure the technical basis for the joint imaging center. Our old system was made for a imaging center of lone fighters. However, if you treat your own patients at several sites and do the evaluation for colleagues working in the hospital, you need a system that can manage the complexity of our imaging center.”

Connecting our colleagues at the different sites and generating statistics for our financial accounting and the health insurances are only two concerns where Mr. Marz and his colleagues expect support from the IT. “RIS must support several processes, have masks for different kinds of service entry and billing and give the opportunity to make comments and manage the documents of several sites case-relatedly,” Mr. Marz completes the requirements. “When we merged five years ago, there was a legacy system in Öhringen and Neckarsulm was about to buy the system we previously used. The newly bought system was used for both imaging centers”, Mr. Marz explains. It was not planned that two additional sites in Künzelsau and Bad Rappenau would be added. “In order to manage the 80 km distance between the imaging centers and to generate advantages from the merger, we needed a new IT system and the matching infrastructure.” Since May 2015, the employees of the joint imaging center work at 51 workstations with medavis RIS and especially the physicians realised quickly which great advantages the new system offers.

New System, better Processes
For example the fully INTEGRATED SPEECH RECOGNITION. With the medavis RIS workstation, the physicians document everything on the spot. They dictate the reports and letters directly into the system and replaced therefore the classical analogous evaluation process with correction loops and printing on paper as well as detours via the typing pool. This saves time when writing almost 6500 re-
ports per month: “Due to the deeply INTEGRATED SPEECH RECOGNITION in medavis RIS, the most resources could be gained. We create reports promptly, so that the patient can take it home. In some cases, the report is already in the referring imaging center before the patient leaves the radiology. This is an important marketing effect. The positive external effect raises the benevolence of referrers and patients”, Mr. Marz gladly explains.

But not only the report creation is quicker and easier with medavis RIS. The new system improved the collaboration of the physicians at the four sites. Since the sites are connected technically, all processes run via the main server with a very good speed. A central installation enables scheduling across sites and combined worklists. The physicians can carry out the orders from the hospital or ask a colleague specifically to carry out the evaluation for a patient according to capacity. Getting a second opinion from the colleagues in the imaging center is very easy.

After the evaluation process and the collaboration across sites have been newly organised and optimised with RIS, the CALL CENTER function of RIS will be connected with the new telephone system in the next step. The telephone operators and the employees at the registration desk will then work at separate spaces, which leads both to improved data protection and to a smooth registration process. “If the telephone is ringing constantly, we cannot work calmly at the registration desk. With our RIS, we will soon be able to solve this problem and even offer home-based work to some of our employees”, Mr. Marz illustrated the new possibilities.

**Successful System switch despite complex Requirements**

“The system offers many possibilities to structure processes.” In order to use the full potential from the beginning, Mr. Marz recommends to imaging centers with a similar challenge to start early with a project group and defined key users. In the radiology Franken-Hohenlohe, the basis for the system change, master data and the provided services of the imaging center were drafted in a small group. “The workstation is so easy to use that physicians manage very well in the classical imaging center daily business.” A greater challenge is billing the services carried out as external service provider or the connection to the Hospital Information System of the clinics. “In order to do this, you need a good concept and the IT responsible on site have to be taken on board early on”, Mr. Marz warns in order not to underestimate the interface projects. It was very important that the exchange with the clinics worked, as the radiology Franken-Hohenlohe provides the CT emergency care around the clock, 365 days a year since January 2010. For these examinations, it is necessary to create cases and for critical reports it is important to transfer them to the colleagues in the hospital via HIS/RIS interface. The patient’s optimal care can only be ensured in this way. In addition to the HIS connection, the connection of other common modalities via DICOM worklist in the imaging center was routine and quickly accomplished.

**Functionality creates Acceptance**

As the processes run smoothly now and better than before, the system is fully accepted by all users. “The medavis Sales department presented the program excellently and took the time to get to know our joint imaging center and understand the requirements. They showed us, what is possible with RIS”, Mr. Marz mentions a reason why the partners opted for medavis. Concerning the system change, he concludes clearly: “It is impossible to discuss everything with everyone. One person has to be the leader and possess the authority to decide. A healthy pragmatism and more time than one might think - these are the factors for success for a system change this complex. But it was well worth it.”
Digitalisation ensures growth

Soon after the foundation of radiox in 1998 it was clear in the doctors’ mind that they have to grow wider and establish new sites in the western Sauerland in order to treat patients professionally and economically. Hence the five founders decided to digitalise the analogous documentation of the patient file to simplify information flow and management tasks. In April 2000 medavis RIS was introduced initially to 30 workstations for ca. 50 employees. “Creating awareness was the most difficult task”, remembers Dr. med Thomas Krambrich, who is one of the founders of the imaging center at the site Soest. “As a senior physician I already had experience with working PC based and I realised that all signs are pointing to digitalisation. It really was not easy to persuade the colleagues to change something that functioned manually very well. The hurdle in the form of employee-scepticism was overcome quickly. After RIS supported billing and patient data filing successfully, PACS was connected in 2002. Nobody had something to say opposed to the relevant patient files from each PC at all sites. They organize their days via worklists and support each other wherever possible, even across sites. This collaboration between colleagues is surely a factor of success of our imaging center and RIS allows us to easily live it.”

IT as Permanent Companion

The radiox team currently has 21 radiotherapist, radiologists and nuclear medicine specialist as well as over 150 employees. RIS is established as the central information platform that has every document and report, even those from the referrer, available. From the initial contact with the patient on the phone to appointment allocation, examination, evaluation, service entry and billing as well as documentation; everything is controlled centrally with RIS. The DIAGNOSTIC PATIENT CENTER, which provides the complete examination and evaluation history of the patient, is available for every user. Information that is relevant for the current case can be selected quickly via a filter. “We take care of many patients for years, the files are therefore voluminous. RIS helps me to find the information I need in the current context”, says Dr. Krambrich. “This increases the quality of my work and saves time. A rewarding investment for sure was the INTEGRATED SPEECH RECOGNITION. Due to the software I dictate directly in RIS, correct errors and release the evaluation, report or letter. In doing so, 90 percent of all reports are done the same day and can be...”

Growing “Big and Strong” together - IT Development driven by Needs and used with Pleasure
sent to the colleagues in the hospitals, ambulatory healthcare or imaging centers. The users even have fun with their digital work due to the intuitive user interface. Even visiting physicians love the system because they get used to the work within 30-45 minutes and are able to work independently from the second day on. That radiox runs smoothly has also to do with the organization for appointment allocation. "With the scheduler, our call center is able to find gaps and react hereon. If a patient does not come, waiting patients are preponed. The next step is to phone a patient on the waiting list and if possible get him or her a spontaneous appointment”, summarises Dr. Krambrich.

Up to date for Ideal Usage
The medavis RIS is developed continuously. Each update provides an improved and functionally enhanced software. Updates are installed mostly automatically and users are informed via Release Notes about improvements. Beyond that, the radiox employees take place in workshops. “The software is developed continuously, not only by the aspects we as long-term user brought to medavis’ attention but also by the wishes of other users or improvements of technology.”

In order that medavis users can use the software at ideal terms on the most recent version, medavis offers its customers a special consulting service. "A medavis employee has a look at our workflow and analyses our processes", explains Mr. Dr. Krambrich. “He finds out, which functions of the system are used in which way. The result of these analyses shows us new possibilities to work simpler and more efficient. medavis offers a very valuable service”, says Dr. Krambrich. Changes do not only come from the supplier. After radiox’ service portfolio was extended to radiotherapy, a software for documentation was purchased for it. The radiox team, who was used to working with RIS, assigned medavis to develop a new interface for bi-directional data exchange. On the one hand from medavis RIS to a radiotherapy system to transfer patient master data in order to avoid a manual registration. On the other hand from the radiotherapy system to medavis RIS in order to have all relevant parameters from the executed radiotherapy available for billing and the physician’s letter in RIS.

Trust in medavis RIS and the Future
Collaboration works well, in both directions” says Dr. Krambrich. He is pleased, that the decision for medavis in 1999 was the right one. "The support is outstanding, quick and competent. I state this also on behalf of my colleagues in the IT.” The trust Dr. Krambrich and his colleagues have in medavis was visible also in 2013 when they ordered medavis to install a new PACS. "Communication is very important in our lives. Especially at work I’m pleased to have nice and competent people on the side of our system provider who understand us. The point in radiology is to communicate successfully with other medical vendors like hospitals, medical service centers and registered doctors. We need our IT so that the communication functions well. For the future I wish that the potential of the IT will be used even more and that we e.g. quickly implement the digital physician letter”, concludes Dr. Krambrich on the issue of IT in radiology.

Facts & Figures
- Imaging Center
- 5 Locations, 1 in Hospital
- 21 Radiologists, 150 Employees
- HIS Integration
- INTEGRATED SPEECH RECOGNITION
The service left much to be desired, a system with frequent failures and that was not built for a growing imaging center due to its structure: This was the motivation of the doctors at the MRI to change this situation when they thought about installing a new RADIOLOGY INFORMATION SYSTEM (RIS). The selection criteria for the new system were easily defined: good availability of the software at all imaging center sites and high stability for the central installation. “medavis was convincing with this criterion and we can still say this in 2016,” Dr. med. Torsten Straube, radiologist and neuro-radiologist (FMH Swiss Medical Association) confirms the decision. His colleague and head of IT, Simon Preisig, adds: “With an availability of 99% our wish back then was fulfilled.”

Standardised Workflows optimise Patient Care and economic Efficiency
In addition to the technical requirements for the new system, the physicians also had their wishes: “If you want to work economically efficiently and want to bear the growth of your imaging center in mind, the standardised workflows play a significant role for success,” Dr. Straube explains. “Even if not all physicians are always happy with it, we agreed upon using uniform worklists. These worklists are available at all sites and for all users at each workstation due to the central installation. This enables colleagues to easily stand in for each other. If a doctor wants to get a second opinion, he simply sends the patient details with a respective order to the worklist of a colleague.

This first commercially organised radiology in the canton of Zurich, Switzerland, distinguishes itself through expertise, certified quality and quick reporting. The Medical Radiological Institute, short MRI, offers radiological and nuclear medicine services at the highest level at four sites. Since its founding, the imaging center is on an expansion course. This is why the holders decided to orient the IT infrastructure towards this goal. Reliability was the decisive factor for the installation of medavis RIS in October 2012.
If a colleague is not available, we quickly know what needs to be done and can distribute the reporting orders from their list.” Due to this, not only the waiting time from examination to diagnosis shortens for a patient, but also the report quality could be improved due to second opinions. With this, the patient care is not only quicker, but also more secure. With medavis RIS, not only the exchange between doctors became better, but also the billing process was simplified. The Swiss billing catalogue TARMED is stored in RIS. The fee codes are documented by the radiographer by entering the rendered services and are sent electronically to the health insurance. “The doctor processed the examinations for his patient by opening them via the RIS worklist and PACS. He can see everything at one glance and thus also controls the fee codes.” As the physician sees at once which examination has been carried out and which billing code was entered, he has the chance to instantly correct errors while the patient is still at the imaging center. “He only needs two or three clicks and is finished,” Dr. Straube says. Of course there is always new potential for workflow optimisation. “That’s why we had a check up at the beginning of this year carried out by medavis at one of our imaging centers, where a medavis employee had a look a our workflows. medavis made suggestions how we can improve these with the existing software and with new modules.” Already during appointment scheduling at the registration a perfect collaboration of software and (trained) employees can contribute to smooth workflows and optimal use of available resources. This does not only increase the economic efficiency, but at the same time patient care; on the one hand by shortening waiting times and on the other hand by optimised reporting regarding quality.

“The satisfaction with RIS is high, as you can rely on the system.”

Dr. med. Torsten Straube
Radiologist and Neuro-Radiologist
(FMH Swiss Medical Association)

Reliability signifies satisfied Users
“The satisfaction with RIS is high, as you can rely on the system. Everyone has access to everything and can work from anywhere. This is very positive for the users,” Dr. Straube sums up. And this is also confirmed from the IT side: “We have few failures and the support is very good and friendly. You realise that specialists receive the tickets and we appreciate this very much,” Mr. Preisig adds. “Although the number of our users has been continuously increasing for many years, the effort for administering the system remains the same - even though more users make more mistakes.”
Security is the Reason for System Change

“If images and patient information are stored in one system, you avoid confusion and increase patient security.” This was one of the reasons why the institute leader Dr. med. Wick decided at the end of 2014 to replace the familiar practice software with the RIS from medavis. He had already seen medavis RIS at other institutes and was therefore convinced from the beginning, that the system would work well. “medavis was my favourite and as we came to an agreement quickly and there was also harmony on a human level, the decision was made quickly,” the radiologist recounts. His requirements for the new system were: Process images and reports in one system, fewer clicks per examination, simple operation, improvement of the communication with the referrer and support of the familiar digital billing with MediData.

Team work: Successful Introduction

In spite of the good feeling with the provider, Dr. Wick and his two doctor colleagues, the seven technicians and the four typists had respect for exchanging the familiar system. “If you can improve something, you have to invest time to save time in the future,” states Dr. Wick. “As we were afraid of the system change, we stalled the decision for a long time. In the end everything worked out very well.” The leading technician Nicole Seiler adds: “The excellent project management has to be praised. During the conversion and introduction you have to rely on working with people that are there and understand the user. The project manager was very reliable, the employees knew what was important and today we still work well together. As both sides were very well prepared, the introduction was very composed. After only half a day without examinations, the practice was fully operative again and the employees coped well with the system.

Almost Magic

All work processes are now controlled on the basis of medavis RIS. This includes the scanner connection working together with the RIS module MULTIMEDIA for a structured archiving of different documents in a completely electronic patient record. The report

High Quality of Treatment and Economic Efficiency

medavis RIS improves billing, accelerates work processes and fulfills the needs of users

The imaging center Rothrist is one of the few institutes in Switzerland that guarantees its patients an examination in the 3 Tesla MRI and therefore offers a higher image quality and shorter examination times. In order for the team of the institute leader Dr. med. Lukas Wick to work economically efficiently in addition to a high quality of treatment, Dr. Wick decided at the end of 2014 to replace the practice management system with a professional system for the radiology. The medavis RADIOLOGY INFORMATION SYSTEM (RIS) was then introduced in the summer of 2015. One year later, the doctors register clearly additional time and the reliability of the system convinces technicians and secretaries.
creation is accelerated by the integrated Speech Recognition. "Unfortunately we did not record times before the change. But I am convinced that we create now more reports per day than with the old system," Dr. Wick names the clear advantages of the new IT solution. The integrated Speech Recognition is one reason for the quicker creation of reports by the doctors. Before, they worked with the digital dictation that was sent to the employees in the typing pool who typed the report and the doctor released it. This detour is now not necessary anymore with the installation of Nuance SpeechMagic directly integrated in RIS. "The Speech Recognition works better in the new system - this is almost magical," Dr. Wick enthuses. "I am completely satisfied and cannot understand colleagues that do not use the advantages of this technology." The leading technician Nicole Seiler also likes working with medavis RIS. "The workload shifted a little bit. What is less work for the radiologists, is more work for us, but the typing pool does not have to type reports anymore nowadays thanks to the Speech Recognition. Therefore we, the technicians and secretaries, became significantly faster altogether." Everything works very well, the system can be used intuitively and is very stable compared to the previous one.

**Fully Digitalised Billing**
The service entry for billing is done in Rothrist by the technicians as they are familiar with the tariffs and the documentation. In collaboration with the billing module and the preconfigured links with the correct TARMED fee codes, the system generates the billing almost completely automatically and checks the billing rules. The accountant only has to check the finished invoice. The communication with the cost carriers takes place in the typing pool. The invoice is sent directly to the insurer via the mediavis MediData Interface per electronic billing. Ms. Seiler explains: "mediavis has the advantage, that the system instantly recognises if something is not congruent. I need more clicks than in the old system, but I make less mistakes as RIS checks the logic for me." Dr. Wick adds: "Sending invoices via MediData was very important for us. This was new for medavis and was implemented and introduced for the first time and works."

**Referrers also have Advantages**
The requirement to optimise the referrer communication was also fulfilled with RIS. The referring physician receives the report within a couple of hours, on average 6.9 h. "For complex examinations or not urgent cases, e.g. for prevention, we take more time. In any case, the patient receives a CD with their images when they leave the imaging center," Dr. Wick explains. Nicole Seiler substantiates this: "Via PACS we create a link for the referrer to view the images online. This has the advantage that the referring physician does not have to import the images from the CD to his system. In addition to the images, we can also make the report available online. Each referrer also receives the report in the form they want - online, via e-mail or as fax - automatically upon release in RIS.

**Good Relationship, Stable System, Satisfied Users**
In the imaging center Rothrist everyone is satisfied and pleased with the decision for medavis. On the one hand because of the possibilities in RIS, and on the other hand because of the stability of the system. Nicole Seiler emphasises: "We had very good experiences both with the project manager and the technical support. If we write in our e-mails an expected response time frame, we always receive the answers reliably. The employees are very friendly and attentive, understand problems and can assess the urgency very well." Dr. Wick concludes: "I rarely needed the support, but I perceive medavis as a dynamic company and that also reflects in the product. medavis takes customer requests seriously and tries to implement them. Those who reject change are wrong at our institute, as standing still is the same as going backwards. In this respect, medavis is a good fit for us. My expectations have been fulfilled."

---

**Facts & Figures**
- Imaging Center
- 1 Location
- INTEGRATED SPEECH RECOGNITION
- MediData eBilling Interface
Imaging centers are experiencing enormous cost pressure. After the investment in expensive modalities, daily operations should run without interruption. The RADIOLOGY INFORMATION SYSTEM (RIS) acts as core of the workflow management; all cases must be scheduled, archived and billed reliably.

On an average day, the 23 radiologists in the Munich-based imaging center group write 500 reports. On busy days, it can be 700 reports throughout the seven imaging centers scattered across the city - a figure exceeding some university hospitals.

"With the investment in the new medavis RIS we made a decisive step towards more efficiency," explained Dr. med. Ullrich Schricke, Medical Director of the RADIOLOGICUM. With medavis RIS, all of the group’s sites now share the same workflow. On every site, the same services and materials are registered in the system for each examination. A dedicated task force is responsible for making sure that fee codes and factors are used uniformly throughout all locations. By working within a multi-site network, radiologists benefit from synergies and are able to ensure sustainable economic efficiency.

Strong together
The partners of the Munich-based imaging center group, Drs. med. Ullrich Schricke, Michael Risch and Michael Röttinger think the greatest advantage of the RADIOLOGICUM is its diversification. Each site in Munich specialises in a distinct diagnostic area of expertise – ranging from microdose mammography, neuroradiology, nuclear medicine, early detection of diseases of the heart, the urogenital tract and blood vessels to the breast centre. “Together we are strong,” is the credo of Dr. Schricke: “Radiology thrives on its referrers. Thanks to our multi-site network, we can provide our referrers with the full range of radiological diagnostic services for their patients.”

This calls for a strong technology partner whose products can actually meet the requirements of such a complex group. After they had defined the requirements specifications and had the first conversations with potential providers, the radiologists from Munich realised that only two vendors would come into question for this decision. “We ultimately selected medavis because we thought that medavis RIS maps our requirements best,” explained Dr. Ullrich Schricke. “Furthermore, we felt in good hands with medavis straight away, as the employees speak our language.” The radiologists are absolutely thrilled about their new RIS ever since they started working with the system. Report writing in particular was facilitated significantly. The long-standing wish for digital online speech recognition finally came true with the medavis implementation.
Well recognized
Today the radiologists dictate and correct their reports themselves. The typing pool could be downsized from five to two employees. Frequently, the report is available directly after the examination - an additional service for referrers, many of whom already access images and reports of their patients online. Dr. Ullrich Schricke said: “We want to provide good reports in a short time. Nobody should wait for long at our imaging centers - neither for an examination appointment nor for the result.” Another important benefit of using a single RIS throughout all sites is the centralised appointment scheduling. Every employee on every site can now directly access the scheduler for all sites. Thus, in urgent cases, radiologists are often able to offer appointments on the same day. If somebody falls down the stairs and tears the meniscus, radiologists cannot let the patient wait for an appointment for three days. Dr. Ulrich Schricke describes one of the advantages of medavis RIS: „Accessing the central appointment scheduling by simply pressing a key and confirming an examination slot can be done quickly on the side."

Seven in one Strike
Doctors as well as assistants benefit from the joint system across the seven imaging centers. It is not unusual that they temporarily work at other sites to fill in for colleagues on vacation or on sick leave. When logging into the system, all personal settings and user profiles - even for speech recognition - are available at each workstation automatically.

If an evaluating doctor requires a second opinion, one call is sufficient and his colleagues can retrieve images, reports and medical history to provide telediagnosis support. As Medical Director, Dr. Ullrich Schricke can also access all the worklists of his colleagues. With a few mouseclicks he can decide if it is necessary to intervene – since occupancy rates of the various sites are not always the same and he can easily see in the system which site still has free capacities.

“We always used the same RIS at all locations. However, the medavis solution is a quantum leap for us”, the radiologist said contently. “Today, all sites interlock harmonically. If a patient receives a suspicious mammography report at one site, a biopsy will be done at another site and all patient details are available in the same RIS system without using interfaces.”

The radiologists at RADIOLOGICUM in Munich would always settle for medavis again. Their RIS makes them strong and keeps the group together. Unlike for many other medical areas, IT is crucial for radiology. Communication and data archiving must comply with quality assurance rules as well as the German X-Ray regulations. When investing into new technology, radiologists rather think in decades and look for established technology partners that have been firmly rooted in radiology for many years. And with medavis RIS, all cases are in good hands.
Working as Part of a tight Network within Outpatient Radiology

The Radiologische Allianz in Hamburg, Germany, efficiently works with a uniform Radiology Information System across the group’s sites.

“In one reason to favour medavis RIS was that it was already in use at two sites. But most importantly, we had the impression that the company could provide solutions to our specific requirements quickly and flexibly or develop such solutions together with us in a short time. This proved to be true,” PSG IT-Leader Stefan Kraus.

In order to stay competitive, it is increasingly important for healthcare providers to network with others on an organisational and technical level – this particularly applies to radiology. The Radiologische Allianz in Hamburg, Germany, has established itself as an outpatient radiology network and introduced a uniform RADIOLOGY INFORMATION SYSTEM to work efficiently and comfortably within the group. The joint RIS enables cross-site planning and evaluation, while keeping each site’s individual profile. In short: RIS turned out to be a major benefit for the newly established network.

The Radiologische Allianz was established on April 1st 2009 by merging three large imaging centers in Hamburg. “After the merger it became clear that we could only benefit from its advantages if we also harmonised our IT infrastructure. A common RIS was number one on our wish list”, emphasised Professor Dr. med. Jörn Sandstede, Managing Director, Radiologische Allianz. The group selected medavis RIS, which was installed at eight out of nine sites by the service provider PSG (Praxis Service Gesellschaft) together with medavis. PSG currently has 19 employees and specialises on IT services for imaging centers.

In addition to the Radiologische Allianz, PSG clients include two other radiology networks in the Hamburg area with a total of 400 users altogether.

“PSG is medavis’ contracting partner and responsible for the technical infrastructure for both software and hardware”, explained Stefan Kraus, Head of IT at PSG. This applies to all client, server and LAN components along with all peripheral devices and the complete telecommunication infrastructure, excluding large-scale medical modalities.

High Flexibility was crucial

medavis RIS was favoured for several reasons: “We needed a system that allows scheduling and evaluation across sites and considers site specifics nevertheless”, said Stefan Kraus. Finally, two systems were shortlisted for selection. “One reason to favour medavis RIS was that it was already in use at two sites. But most importantly, we had the impression that the company could provide solutions to our specific requirements quickly and flexibly or develop such solutions together with us in a short time. This proved to be true.”
The vendor’s flexibility is crucial for such a large and complex RIS installation. “For example, we required different letterheads and document templates for our sites. We also needed the possibility to assign material to examinations site-specifically”, emphasised Sibylle Feyerabend, Head of Radiology Administration at Radiologische Allianz.

All requirements were implemented quickly so that the system rollout at 160 workstations in different locations went smoothly at the turn of the year 2012 and was completed within six months. The project was split into two parts. For each part, two to three medavis employees were on site for several weeks to jointly implement the system with PSG and to train approximately 180 users.

In technical terms, a centralised infrastructure was set up with a central server situated at one of the main sites. “All workstations access this server through a private MPLS network”, explained Stefan Kraus. Not only RIS data is transferred across the network but also a great amount of DICOM images and speech data. “This requires high transfer rates, so we had to readjust. Our goal is to have a transfer rate of 100 Mbit/s throughout the network. But we are not quite there yet.”

**Multi-site Workflows facilitate daily Work**

Due to the implementation of medavis RIS, physicians and technicians at the Radiologische Allianz can now work efficiently across all sites. A good example is the elaborate evaluation workflow that Radiologische Allianz and PSG developed together. Sibylle Feyerabend explained: “Depending on the physicians’ requests, the technician can either send an examination directly to a particular physician’s worklist or to the central worklist pool for evaluation.” Thus, the capacity of the large number of radiologists who partly work on-site and partly switch between sites is optimally used and the different locations’ working hours are well balanced. Another reason for increased efficiency in daily operations is the central appointment scheduling via medavis CALL CENTER. The system enables users to quickly search for free appointment slots across locations and provides an overview which physicians and modalities are available. This reduces the patients’ waiting times to a minimum.

Speech recognition is a third area where the centralised infrastructure with a joint RIS can play at its strengths. The Nuance solution 360 | SpeechMagic SDK is deeply integrated into medavis RIS. Physicians can dictate directly in the RIS user interface and have direct access to previous reports without having to switch between applications. “The processing times until the released report are significantly shorter than for conventionally dictated reports. We currently have 46 speech recognition licenses. Apart from a few exceptions, almost all of our physicians use speech recognition for their reports”, said Stefan Kraus.

The individual speech profiles are downloaded from a central server, independent of the workstation or site a radiologist is currently working from. All dictations can be centrally corrected by the typing pool if necessary. Once downloaded, the specific user profile is always available at that particular workstation and will only be updated as needed.

“Nowadays, our physicians frequently change locations. This is why the flexible use of speech recognition has become indispensable for us”, said Sibylle Feyerabend.

Overall, the implementation of a uniform RIS across all sites laid the foundations on the IT side for a successful merger.
The GeRN treats Patients, medavis RIS connects

Stability and Functionality - medavis RIS as a reliable Companion also for Nuclear Medicine

The society for radiology and nuclear medicine, short GeRN, connects its nine sites on the East Frisian peninsula in Germany via a radiology information system (RIS). 24 physicians in tight collaboration with clinics and referrers care for the people in the region. The RADIOLOGY INFORMATION SYSTEM (RIS) from medavis has networked all nine sites and supports radiologists, technicians and administrative employees in their daily work also with the new module NUCLIDE MANAGEMENT since the end of 2014.

Back in March 2014 the GeRN decided to introduce a uniform RIS at the nine sites of the joint imaging center for radiology and nuclear medicine and implemented it consequently. Already in the middle of October the first two imaging centers started working with medavis RIS, three sites started in November, and finally in December the remaining sites had their go-live. The central RIS today supports all administrative and medical processes concerning treatment across sites. “If you are planning a RIS change in this dimension you are in for long nights,” Frank Olin, IT team leader and project manager of the RADSERV GmbH, that has been contracted as IT administrator for GeRN, remembers with a smile. “But you are that much prouder when the system runs stably from day one and the error quota is on the level of the previous solution within day two. If the system then also fulfills the wishes that were the driving factor for the decision, you have done everything right.” Edgar Rabenstein, representative project manager at the IT provider concretises that: “A central appointment management should help us to avoid unoccupied modalities and standardised processes should improve the workflows and therefore the economic efficiency of GeRN. It was not easy to find a system that fulfilled the high demands of the 24 managing doctors and among other things also for the area nuclear medicine.”

System Change with Success

That medavis was one of the three convincing providers, was firstly due to the matching functionality range of the software, that offered in addition to the appointment management also a fully INTEGRATED SPEECH RECOGNITION on the basis of Nuance SpeechMagic. Secondly, the user interface is intuitive and the provider medavis had project experience in building interfaces to modalities, PACS and hospital information systems (HIS). “We consolidated the PACS of 5 sites and changed RIS at once and in addition, the HIS integration had to go live on the same day. The medavis employees were very flexible and professional during the complete project phase - during implementation, finding the go-live dates and the close follow-up. We had a good organisational control during the system starts, medavis contributed the understanding of processes and technology,” Frank Olin describes the collaboration. Therese Helmerichs, radiographer for nuclear medicine can report from a user point of view that the train the trainer concept succeeded: “At first I was sceptical how we as key users should train our colleagues how to use a system that was also new for us. But it really was sufficient to train the key users how to use certain functions and have them transfer their knowledge to their colleagues. In this way, each user could do their work from the beginning and learn on the job. One advantage was that the trainer was always available for questions and today still informs the team about new features and trains new colleagues.” “Due to the good preparation on our side, the medavis project manager had time to take care of user questions during the go-live. The users were already familiar with the system, so that they expressed feature requests rather than problems,” Edgar Rabenstein adds.

Defaults and homogenous Data as Challenge

“It was impressive that everyone pulled together at go-live,” Frank Olin concludes the implementation. “We acquired the know-how to implement complex projects by selecting the right RIS provider. It was more difficult to standardise the requirements of the nine sites and model it in a uniform software.” The users had to agree upon one joint examination catalogue and the emplo-
yees of the connected hospitals were brought onboard: “We had and have to make sure that the correct details are transferred back to the HIS that originally sent the order to the central RIS installation,” Frank Olin explains. “At the same time as the RIS installation, we also carried out a PACS consolidation. In order for this to function, a lot of diligence was necessary. The patient IDs had to be merged and links created a new. We could move the PACS data during operation, because the RIS and PACS providers worked hand in hand.”

**Maximal Flexibility with central Installation**

Due to the professional implementation, the institutions benefit from a uniform software today. The three call centers now work identically, schedule patients and optimally use modalities and physicians to their capacities. “We now have finally solved the problem, that impatient patients get two appointments in two imaging centers and show up to the appointment they prefer without cancelling the other one,” reports Edgar Rabenstein. The new system also has a positive effect in other areas: more and more colleagues support their colleagues at other sites with their second opinion by helping to write reports from the central pool. The collaboration at GeRN also works via central worklists. The radiographer at the modality decides, if they should send the reports to a central list, the report pool or to the individual worklist of the attending physician. The speech recognition can be used everywhere via terminal server, even at home, as soon as a secure connection has been established. Maximal flexibility and speed is a clear added value of the new solution. “With medavis RIS, you can find information quicker than before,” Edgar Rabenstein summarises.

**RIS for Nuclear Medicine**

A specialty the provider medavis implemented additionally at the request of GeRN is the NUCLIDE MANAGEMENT. There is a special documentation obligation for nuclides as they are radioactive. “The trade supervisory board wants to know in which quantities radioactivity is ordered, delivered, administered to the patient and how much exited the patient,” explains Therese Helmerichs. The medavis NUCLIDE MANAGEMENT is easy to use, workflow-oriented and fully integrated in RIS. The functional scope ranges from the monitoring of received and removed nuclides and an automatic calculation of the current activity up to an integrated service entry with fee codes and billing of nuclides and radiopharmacons. Billing of nuclides and radiopharmacons and retrospective removals are also possible. A sophisticated permission management, the possibility to create master data across sites and a display depending on the site supplement the functionalities.

**Stability and Functionality**

The advantages of a central RIS solution are only the functions usable across sites for IT professionals: “Today I have far less effort with the installation and as the system also runs very stably, my colleagues and I have significantly more time for the users,” Frank Olin sums up the success of the project. “And the performance is also great,” Edgar Rabenstein adds gladly.

---

**Facts & Figures**

- Imaging Center
- 9 Locations
- NUCLIDE MANAGEMENT
XXL RIS: More economic Efficiency and better Quality of Care in the radiological Network

The supra-regional imaging center group radiology and nuclear medicine Bonn - Bad Godesberg - RheinSieg with 8 sites works with the RADIOLOGY INFORMATION SYSTEM (RIS) of the company medavis. The tight cooperation of the physicians ensures an optimal information flow to the patient, the referrer and the colleagues at several regional clinics. The patient benefits from the care nearby and treatment of the highest medical standard.

One RIS fits all
When, as in the case of this imaging center group, 20 physicians work at 8 sites with their employees with a total of 72 RIS workstations, it is a complex challenge for the IT infrastructure. About 150,000 examinations per year, more than 500,000 patients and more than 1.3 million examinations - this amount of data is mastered by the RIS database; and all sites can access the database centrally without performance problems. medavis RIS controls the information flow between all participants flexibly and reliably with interfaces to all 34 modalities, PACS and a hospital information system. Professor Dr. Vahlensieck, radiologist, managing director and jointly responsible for the IT infrastructure of the imaging center group remembers: "After a very intensive planning phase that was carried out very professionally by the medavis employees, we were happy to start with our new RIS in July 2013. We had high expectations what should be improved with the new system after having dismissed the previous system after only three years." The requirements for the new system were clearly defined: fluent working across sites from patient registration to evaluation and billing, quick availability of images, independent of the workstation. "The connection with our PACS did not work very well with our old system," Prof. Dr. Vahlensieck remembers. "We also had some unsatisfactory attempts with speech recognition. Our decision to buy medavis contributed the facts that medavis offered a deep integration and also works together with the market leader in speech recognition, which was highly recommended by colleagues and the conversations we had with medavis employees." At the beginning, we had to double the network bandwidth, so that all physicians could work across sites with the central RIS without delays, but today the central star-shaped installation runs stably and reliably. "Installations with the same dimension as ours are a challenge. In the area of network, the consulting by the provider is important, so that you know in advance which bandwidth is necessary. We had to readjust a little bit, but then everything ran smoothly. The users are satisfied," Professor Vahlensieck describes the start with the new RIS.
One Patient Record, networked Working, quick Documentation
Almost two years later, medavis RIS has become an integral constant and faithful companion in the daily imaging center. Independent of the workstation and the site the physician logs in, his personal user profile and the complete patient records are available everywhere in the imaging center group. The central storage of data of all imaging centers ensures the access to previous reports and images, even if the patient was treated at another site before. This enables the physician to optimally prepare for the patient and, if necessary, exchange opinions with the colleague who treated the patient previously. “The alpha and omega is, that all necessary information on the patient, even from the past is available quickly and completely. Our radiologists can exchange information at all times, organise stand-ins and dispatch work with medavis RIS - the central worklists make this possible,” Professor Vahlensieck explains the IT concept across sites.
The user profile for the radiologists provide the user with his individual settings including speech recognition independent of where the user logs in. “We only had bad experiences with speech recognition before. Now it works flawlessly,” Professor Vahlensieck is happy about the true improvement of his daily work. The physicians of the imaging center group dictate their reports and letters directly via the RIS workstation, correct them and the documentation is complete. In the meantime, the software learns constantly. As soon as a radiologist corrects a word wrongly recognised three times, the system recognises this word and remembers it in the future. “Of course we also maintain a central dictionary, but this learning function is great in the workflow,” finds Prof. Vahlensieck. Although the speech recognition accounted for additional costs, it was worth it. Five employees that worked as typists before could take over other responsibilities. “The new workflow led to the change that we can now hand the patient the report immediately and the referring imaging centers and clinics are informed in a short time on the patient’s condition, sometimes only five minutes after evaluation. All in all the process support works very well with RIS. The radiologist does not have to administer, and that’s how it should be,” Prof. Vahlensieck concludes.

Clear and reliable Appointment Scheduling
In addition to the evaluation process, especially appointment scheduling has improved in the imaging center group with the introduction of medavis RIS. Six employees are only occupied with scheduling appointments. They are optimally supported by RIS when registering the necessary details of the patient and the search for matching appointment slots. “With this module, appointments are structured very clearly and you receive a quick overview due to the coloured codings.” Thanks to the well prepared documentation already during appointment scheduling, the patient is optimally prepared for the technician,“ Prof. Vahlensieck praises the software. “In total, my colleagues, employees and I are very satisfied with the system and would instantly recommend it. For me it’s important that the contact in support cases functions. This is significantly better than with our previous provider. I simply expect that I - as IT layman - can describe a problem and the employee makes an effort to understand me.”

Facts & Figures
• Imaging Center
• 8 Locations
• ca. 150.000 Examinations/year
• INTEGRATED SPEECH RECOGNITION
Practical Experience shapes and generates Demands
iRad especially highly appreciates the partnership and quality. Already in 1998, the radiologists worked with the medavis RIS. As a day one customer, the physicians have accompanied the development of the system for almost two decades. Dr. Friedburg initiated the introduction of medavis RIS and remembers: "When we founded the imaging center in 1990, we introduced another RIS. The former provider could not adjust the system according to the requirements of the German Health Insurance Association KV on time. Therefore we looked around for a new system. In the imaging center, the wish for a quicker, more functional RIS that precisely models the processes of the imaging center and meets the requirements had existed for a while." In this way, the three founders of medavis met a demanding customer with eight years RIS experience right at the start. As Dr. Friedburg found a provider with medavis whose office is right around the corner, the collaboration started with an exceptionally intensive exchange. "The excellent connection has endures over the years," exclaims Dr. Friedburg satisfactorily.

Process-oriented: Now and Then
The system introduced in 1998 should transfer patient details to the modalities to avoid double entries. It also should support the workflow by sending the patient details to the worklist of the findings provider as soon as the technician carried out the examination. The RIS automatically creates the billing and also checks the rules. If the service entry is e.g. not plausible, as services that rule each other out have been entered, the responsible staff receives a notification in order to make sure that the correct invoice is sent.

This is still the same today, but the processes have been further optimised in many points: "Everything has to be done quickly. This was true before as well, but today we work with solutions that are really well-suited to each other," Dr. Friedburg explains. "The voice recognition is a good example of this. Today, I dictate my reports directly into the system and it is available to all employees quickly. Luckily, we left the detour with cassettes behind us and have been using digital dictation since 1998. After getting to know four different speech recognition solutions, the fully-integrated version from medavis is the first that works as I envisaged it to a quantum leap from my point of view.

Across Sites and fully integrated
Since the function with the radiology in Karlsruhe Durlach in 2012, the physicians of iRad work with a central RIS at both sites. The RIS module MULTIPLE SITES allows you to work with central worklists. You can always ask your colleagues for a second opinion or to stand in, as the patient record can be accessed at both sites. A central database ensures that patient details, reports and pictures are available across sites. "We already introduced a digital picture archive in 1998. PACS makes all pictures available in less than one minute, independent of how many studies the patient has. As we immediately scan external reports and import external images with reference to date and time and store it in the respective record, we have a complete overview of the patient history independent of the site," explains Dr. Friedburg. Both sites benefit from the central CALL CENTER for scheduling patients. The employees work in a separate room in order not to impede the registration at the front desk and can work without interruptions. For calling the patient and scheduling an appointment, they use the CALL IDENTIFICATION in RIS. If the patient has already been to the imaging center, the number will be recognised and the record will open automatically. If a new patient calls, you can create a new record and already document the details relevant for the examination. This later saves time at the registration desk. "With medavis, we have reached a new efficiency for scheduling," Dr. Friedburg says pleased. "Our call center employees can prioritise incoming calls according to the displayed information and take them depending on the urgency. Patient registration has become more..."
demanding. The reason for this is both that the treat-
mements have become more complex and the scarce
documentation of the referrers.” The information
provided during scheduling are entered in the RIS
scheduler and RIS recognises if a patient already
exists in the system. Changes of the appointment later
on are quickly realised. The digital scheduler enables
a structured planning of patient visits; depending on
the symptoms and the
planned diagnostic in-
vestigation, important
factors such as claus-
trophobia or obesity are
already clarified during
scheduling to reserve
the correct modality for
the necessary amount
of time. “As we conse-
quently scan external
reports and clarifica-
tions, they are digitally
available at each RIS
workstation - we are
living the dream of a
paperless office. Additionally, referrers can access re-
ports and images via the referrer portal. We also docu-
ment the patient’s consent for the procedure in RIS,”
Dr. Friedburg summarises.

Developed by RIS Experts
In the course of the merger with the imaging center in
Durlach in 2012, it was important, that medavis RIS
would be used as central system at both sites. “Our
colleagues found it difficult at first, just as with every
software change. The complaints quickly became less
and the employees are now very satisfied with their
RIS. With medavis, we use an upper-class system and
a Mercedes is never exactly cheap. Only professional
tools are profitable for professional use. I have a
system that fulfills all of my wishes. And if we make
an error, the medavis support helps us in a simple and
uncomplicated way,” Dr. Friedburg further explains. In
addition, an IT employee of iRad trained by medavis,
who knows the system very well, takes care that the
system runs reliably.

It is clearly company policy at medavis to invite both
assistant employees and the head physicians to sys-
tem trainings regularly. An offer Dr. Friedburg gladly
accepts time and again: “The longer you work
with an IT system, the more routine-blinded you
become. That’s why medavis had the clever
idea that medavis em-
ployees have a look at
how we work with RIS
in our imaging center
and analyse it in addi-
tion to standard software
trainings. I am curious
how we can improve
how we work with the
system and optimise our
workflows with the results that we shall shortly
receive.” This “Checkup” is an offer by medavis
especially for long-time users to change routine habits
that stand in the way of optimally using the system in
its current version.

“For me it is important that our system offers a
sensible structure that we can adjust to the working
habits of our physicians. This increases acceptance,”
Dr. Friedburg explains the technical circumstances.
According to Dr. Friedburg, the future will bring further
interesting digital mile stones, e.g. the integration of
computer-assisted diagnosis. If we compare images
with an image database in the future with techniques
of pattern recognition and analyse them by defined cri-
teria, in the future RIS could make suggestions and
support the decisions of physicians.
To ensure emergency care for the north Mark region, medavis RIS accompanies the physicians of the Radiology Iserlohn to their home.

The Radiology Iserlohn has offered radiological professional competence with the most modern technique for more than 30 years for patients of the north Mark country. 24 hours and seven days a week the eight physicians of the joint imaging center write reports in turn not only in their own practice but also in the hospitals St. Elisabeth Hospital Iserlohn and the Evangelic Hospital Bethanien on site. Thanks to certificated teleradiology they also ensure emergency care for many other radiologies in the country. "Our previous system, technologically spoken, had reached the end of its life cycle. Although the supplier offered a new system, it was still in an early phase of its development. We wanted a proven, stable system and decided on medavis after we had compared several solutions" explains Dr. Hollenhorst how the RIS change took place. “The new system should have a simple to use interface and especially communicate directly with the modalities, so that the patient data from the devices can be called up directly in the patient file in RIS. Integration of speech recognition was also very important for us" explains the radiologist the requirements. His conclusion: "RIS from medavis was from the viewpoint of complexity the most comprising system and yet easy to use. It can do everything an imaging center needs."

Optimised Patient Care
The radiology Iserlohn consists of an imaging center in the town center as well as a second site in the Bethanien Hospital. Both institutions are digitally interconnected. The private homes of the physicians have also been digitally connected with the imaging center to ensure emergency care for the Mark region around the clock. “We want to treat all patients optimally” says Dr. Markus Hollenhorst, practice partner since 2013. “In doing so we had to optimise the work processes and this only works with a reliable and practice-approved IT. This enables us to offer our expertise also in rural regions and the hospitals, who have too few colleagues in the radiology, to offer an optimal patient care also during the weekends and in the night.” At the end of 2014 the decision was made to purchase a new RIS in order to make work easier and to optimise the data exchange for communication with the referrers as well as for the development of a whole electronic patient file. "Our previous system, technologically spoken, had reached the end of its life cycle. Although the supplier offered a new system, it was still in an early phase of its development. We wanted a proven, stable system and decided on medavis after we had compared several solutions" explains Dr. Hollenhorst how the RIS change took place. “The new system should have a simple to use interface and especially communicate directly with the modalities, so that the patient data from the devices can be called up directly in the patient file in RIS. Integration of speech recognition was also very important for us” explains the radiologist the requirements. His conclusion: “RIS from medavis was from the viewpoint of complexity the most comprising system and yet easy to use. It can do everything an imaging center needs.”

More Safety and more efficient Processes
With the introduction of medavis RIS in April 2015 these requirements were met. The digital connection with the modalities means reduction of work for the MTA and more safety for the documentation as well. Via DIAGNOSTIC PATIENT CENTER all information is always available at a glance in RIS. "Work is so
much more comfortable this way for the physicians. We can adapt the data view according to our individual preferences and report directly thanks to the INTEGRATED SPEECH RECOGNITION. Not only do we have the current examination in mind, but we also have access to information regarding the patient – for example scanned documents or previous reports.” Dr. Hollenhorst is pleased with the enhancements for his work.

Work procedures have also changed for the MTA and the administrative staff when the new RIS was installed. Whereas five of eight physicians already use the SPEECH RECOGNITION, employees from the typing pool could be deployed to the central appointment scheduling. Scheduling was previously done by each MTA themselves for the respective device. “Our MTAs now concentrate only on their core competence: the examination. Appointments are now centrally scheduled and coordinated. This leads to a significant better practice organisation, but also to an increased workload for the employees at the registration” explains Dr. Hollenhorst. “What today is accepted very well, was not easy at the beginning” notices the radiologist thinking about the time after the initiation. “Because work conditions and also competences have changed for MTA and administrative staff, there were frictions at the beginning, because “my work” was all at once provided by someone else. But one year after the initiation we can say, that the employees value the advantages. The migration was not so problematic for the physicians. Dr. Hollenhorst attributes this to the fact, that the colleagues have previously worked more with the computer and are rather technophile. The advantages have been clear: We save time merely while the analogue signature is cancelled. And the physician’s work procedure is so easy, that everyone can cope with it. A huge simplification is also the automatic fax and e-mail transmission. If one would fax 200 reports per day manually, the person would be occupied for half a day.”

Better Control and economic Efficiency

The software also brings advantages for the tight collaboration with the hospitals. “Thanks to medavis I can see all previous reports from all locations I work at on-site. Previously, I didn’t know that the patient I treated in the practice had for example a CT 14 days ago in Bethanien Hospital. Today we have a bigger diagnostic safety and avoid double examinations, because all information on the patient are bundled in the radiological file.” RIS also supports the economic efficiency: “The statistics give me a wonderful and exceptionally quick overview about the workload of our practice and, very important in our case, how many reports we have already provided for a referring unit.” The radiology Iserlohn has organised the external radiological reporting via quota. With the help of hospital-specific statistics, Dr. Hollenhorst requests e.g. how many CTs have already been provided for a specific hospital. This way he notices at once, if examinations should additionally be charged to a hospital. “With a quick click in the system I can tell you, how many direct patient contacts we had in Q1/2016, in this case 13,500, and that we executed 22,700 examinations. For controlling our practice and the cross-site care of other locations, this is a huge profit” means Dr. Hollenhorst.

Completely satisfied

Dr. Hollenhorst and his team are completely satisfied with the decision for the medavis RIS. The system runs stably and makes the daily work easier. The sale process was very fair and professional as well as training and support, both before and after the change, states Dr. Hollenhorst today: “Everything went well and I would recommend medavis at any time.”
Since 1997, medavis has been synonymous with medical IT that goes the extra mile:

- State-of-the-art software technology
- Future-oriented, scalable and upgradable IT processes
- Customised services
- IT experts in radiology process-optimisation and network architecture
- High-performance products with depth of functionality
- Long-standing project experience
- Top-class customer service with qualified staff

Imaging centers, hospitals, clinic chains and teaching institutions in Germany and abroad – over 600 medical institutions of all sizes already rely on our radiology workflow solutions medavis RIS and portal4med.

medavis GmbH
Bannwaldallee 60
76185 Karlsruhe
Germany
Phone: +49 721 92910-0
Fax: +49 721 92910-99
E-Mail: info@medavis.com
www.medavis.com
© 2017 medavis GmbH
All rights reserved.