



# Focusing on interoperability: Oslo's Ullevål University Hospital drives IT integration

## Customer story

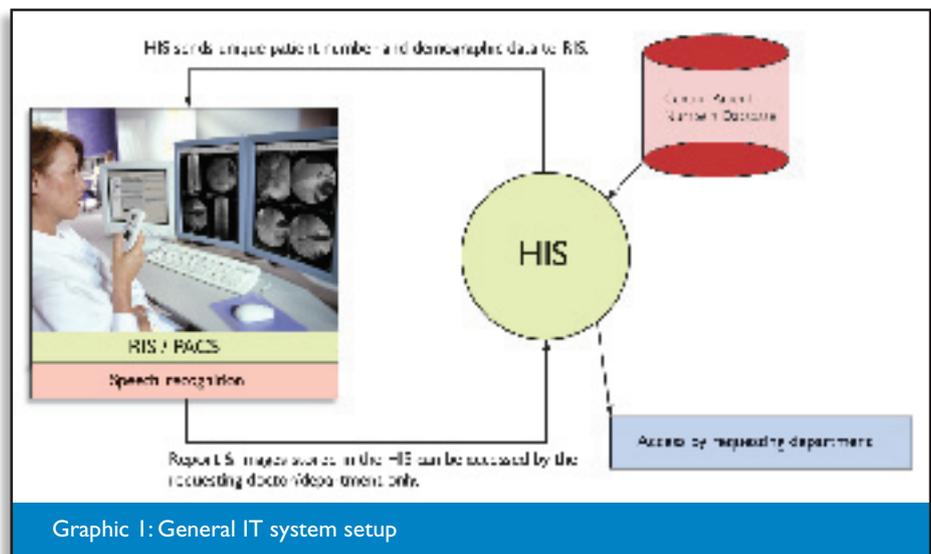
Although initially it felt like a shock wave, when 60 radiologists went live with new RIS, PACS and speech recognition systems all at once, the time required to finalize radiology reports at Ullevål University Hospital – Norway's largest healthcare facility - decreased by 96% in two years. The hospital is now testing a system to exchange reports and images between its own RIS and PACS and those of other hospitals. Looking back on the last two years, the Ullevål University Hospital has learned many lessons, worth being considered by other healthcare facilities throughout Europe.

### Securing accessibility

Ullevål implemented SIEMENS' MagicView PACS with MagicSAS RIS. The RIS interfaces with the Hospital Information System (HIS) to retrieve the demographic patient information. The Norwegian National Registry supplies the HIS with the individual identification number and demographic data of every patient. In contrast to the health card, planned to be introduced in other European countries, the Norwegian National Registry stores no patient history or diseases whatsoever. If a patient is not registered in the database (e.g. infants, foreigners) an emergency patient number

has full access to the information needed – without time being wasted on transportation (see graphic 1).

During the implementation phase of the new PACS/RIS, the hospital realized that the time needed to finalize a report is still significant and could last up to several days, according to Knut Gronseth, Medical Chief of Central Radiology. "During holidays or in periods of high sick leave, the secretarial team was overloaded with work," he recalls. Speech recognition, as offered by the Norwegian speech processing company Max Manus AS, seemed a promising solution and was added to the RIS last minute. All three



can be generated in the HIS. All systems communicate bidirectionally, so that once a report is finished in the RIS, it is sent back to the HIS together with the images from the PACS. Now, the requesting department

systems went live in one go. 60 radiologists started correcting and finalizing their reports without the help of a secretary on the same day – not a feasible scenario, as it turned out. Radiologists were unsatisfied



Jack G. Andersen, an economic consultant for the hospital found SpeechMagic to be a catalyst for fast availability, distribution and accessibility of medical information.

with speech recognition, the time they had to invest in creating reports increased significantly. The hospital pulled the emergency break. “You need to be realistic,” says Jan Olsen, senior advisor in the medical services division, and “you need to plan thoroughly to avoid rejection of the system by the users.” In retrospect, a more gradual approach would have been favorable. Jan Olsen identified the three major points one needs to consider:

**1) Ensure proper training of the users and optimized voice profiles**

The hospital is using Philips SpeechMagic technology, which constantly adapts to individual voice characteristics and dictation styles. A training period of only a few minutes improves the initial recognition rate.

**2) Provide workflow flexibility**

Online or frontend speech recognition allows radiologists to finalize reports independently without relying on the availability of a secretary. However, it can

also require more time for the review of recognized reports. In some areas, e.g. high-volume reading for orthopedics, radiologists should be given the option to choose whether to use frontend recognition or have the dictation recognized in the background and reviewed by a secretary.

**3) Centralized administration of recognition vocabulary**

A central recognition vocabulary has the benefit that all words, adaptations or changes are available to every user. On the other hand, this means that words added mistakenly to the vocabulary affect all users. Therefore a dedicated person, a “super user” as the hospital calls it, needs to handle adaptations and additions to the recognition vocabulary to ensure accuracy and standardization.



“The level of language standardization achieved through speech recognition wouldn’t have been possible with a secretarial team”.

Eldri Hanholm is Ullevål’s “super user”. She administers the central recognition vocabulary, and defines the radiology department’s orthographic rules. The orthography of many words has recently changed, resulting in spelling inconsistencies. Eldri identified 4,675 words, so far, with up to five orthographic variations per word, which she registered in the vocabulary. No matter what the user dictates, the system will automatically write the correct orthography (See table 1). “The level of standardization of the language achieved through the speech recognition system wouldn’t have been possible with a secretarial team”, says Eldri. “It is important to have somebody in-house who administers

the recognition vocabulary and you should calculate some time to customize the technology. In our case, this was what rescued the system.”

Table 1: Examples of orthographic variants:

Previous orthography	New orthography
Fractur	Fraktur
Emphysem	Emfysem
Pleura	Plevra
Thorax	Toraks

# Speech recognition powered reporting



*“When introducing SR you need to inform people that it requires some time to become acquainted with the new technology and a bit of user commitment to make it successful.”*

Ruth Mona Tjonneland, head of the pediatrics department.

Radiologists select an exam or request from a work list in the RIS to open a word template and start reporting. Thanks to the interfaces between RIS and HIS, the word template is automatically populated with the corresponding patient demographics. Completed reports are sent to the HIS, from where the clinicians in the hospital can access them. To ensure confidentiality, only the requesting doctor or department can access radiology reports. While in the beginning all radiologists were only given access to frontend speech recognition, the system has been opened up in the meantime, allowing the flexibility to switch between the various workflows, depending on the situation. Radiologist Johan Hellund prefers to work backend when processing x-rays from an outdoor emergency clinic – approx. 100-130 exams per day. “This way I manage to report and validate 100 examinations within 3 to 5 hours”, he says and recommends other emergency departments to choose background speech recognition as their default workflow. However, in an emergency situation when he needs the report instantly or when processing difficult examinations, he uses the frontend workflow: “It is almost a 50/50 split.”

The 20 secretaries who previously transcribed dictations have now moved to other areas; they are thankful for a more diversified job. “Typing dictations the whole day is boring,” says Eldri Hanholm. While at the beginning fears of job loss persisted, the secretaries today are pleased that the system is in place and appreciate the hospital’s commitment to redeployment.

From a radiologist’s perspective, the speech recognition system today ticks all the right boxes. “Personally I like it very much, I’ve never seen it as a time consuming technology. While it is true that it requires

more time from radiologists to finalize a report, the overall time-gain for the department is so impressive that today almost everybody is convinced by the technology,” says Mr. Gronseth. “Previously, we had to dictate on tape, the secretary had to write it, we read it again, made corrections and sent the report back to the secretary. This was followed by a second review until we could finally sign off. This process took several hours or even days. So the added time during online recognition is relative,” he says.

A report of a normal x-ray of the chest may be finalized within a few seconds and “that’s it,” says Mr. Gronseth.

## In-house evaluation proves successful

Jack G. Andersen, an economic consultant for the hospital and Ruth Mona Tjonneland, head of the pediatrics department initiated a study to evaluate the effects of speech recognition. They defined the turnaround time (TAT) as the time between the submission of a request and the completion of the final report, while the passage time (PT) indicates the period of time between the start of an examination until the availability of the results in the HIS. The study found that speech recognition is a catalyst for fast availability, distribution and accessibility of medical information (see table 2). The TAT in an ultrasound examination has improved by 29%; however, the most significant improvement has been achieved in the PT with a 96% reduction in time from the start of an examination to the availability of the results (see graphic 2). This figure must have improved even more as, in the meantime, physicians can sign off their examinations electronically, according to Andersen.

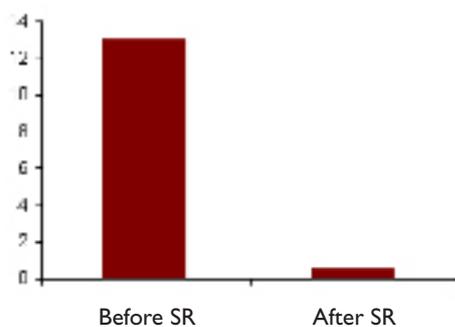
Although now highly satisfied, Tjoenneland points out that they weren’t aware of

Table 2:

	Old	New	Change
Avr. TAT	65h	46h	29%
Avr. PT	13h	0.5h	96%

Graphic 2:

Passage Time (PT) in hours



how much time it takes to customize and adapt the technology. “We thought it would work all right from the start. But we had to invest 1.5 days a week to adapt the ConText,” she recalls and advises that when introducing SR it is critical to inform people that improvement requires some time to become acquainted with the new technology, as well as a bit of user commitment to make it successful.”

### Looking forward

Today, most patients who move between hospitals receive their images on a CD. There are projects trying to build a national

database holding some meta-data on the patient history; however, this is still in the very early stages. As in most European countries, confidentiality is strictly regulated, and it is not allowed to send patient records from one hospital to another without the approval of the patient or in an emergency situation. Still, Ullevål is now setting out to eliminate the need for CDs by piloting a system which enables the exportation of the report and the corresponding images to the RIS of another hospital. To do so, the user selects an exam from the RIS and the system automatically

attaches the corresponding images. The data is transferred over Helsenett – a network established exclusively for the communication between healthcare organizations – to the PACS/RIS system of another hospital.

Here the report is imported first, and generates a request based on the XML information attached to the report (requesting doctor, department, etc). Then the images are allocated in the PACS and linked to the corresponding exam in the request (see graphic 3).

Jan Olsen said that the next step would be to make the received reports and images also available in the HIS or electronic patient record, so that requesting physicians can access radiology examinations without the need to involve the radiology departments.

### Conclusion

“For us, time is of essence,” said Ullevål’s radiologist Hellund. The hospital invested time - to gain time. Speech recognition turned out to be the core time-saving element in the entire HIS/RIS/PACS infrastructure. If implemented properly, with a realistic approach and expectation, the technology is able to contribute to massive time gains, rarely achieved through a technology system so far. However, a significant time investment is needed to adapt and customize the system – in order to achieve user acceptance and reduce the reluctance to change. When considering the recommendations given by the hospital this will lead to a highly efficient, time-saving system.

