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## Editorial:

W. Kalender  
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# Teleradiologie according to German "Röntgenverordnung" - exemplary application of the Open Source Software "SecTelMed"

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## Abstract

Telematic solutions are always more frequently used out of different motives. It is necessary to observe the most different legal prescriptions. With the Open Source software SecTelMed we introduce a telemedicine solution which is reliable and optimally integrated into the medical workflow. Of course the software introduced here also satisfies the legal framework conditions. The data interchange takes place over communication servers encoded via SSH or e-mail. So ad-hoc connections and also communications on leased lines get possible. The interoperability with other products is ensured through the implementation of the recommendation for the standardization of telemedicine of the IT-Working Group (Arbeitsgemeinschaft für Informationstechnik, @GIT) of the Radiological Society of Germany (Deutsche Röntgengesellschaft, DRG).

## 1 Purpose

The current developments in the German health service force the involved participants to more efficiency and cost reduction. Telemedicine is used for consultations preferentially: at first the patient's pictures are send to an expert instead of carrying the patient to a further treating center.

The Teleradiology offers its services as a solution for the emergency supply by smaller hospitals (< 500 beds) as well as for the routine supply in undersupplied areas.

At first the aim was to produce a secure and relieable data transmission between a peripheral hospital (Diakonie Bad Kreuznach) and the university hospital of Mainz: computed tomography's images with neurosurgical questions should be processed in Mainz to assess the necessity of transporting the patient to a neurosurgical unit for further treatment. Needless to say the solution must fulfil legal stipulations.

The solution used must on the one hand fit in with the already existing IT infrastructures and the workflow. On the other hand is has to comply with current communication standards.

## 2 Materials and Methods

The software SecTelMed (Secure Telemedicine) is a development of the Johannes Gutenberg-University of Mainz, Department of Radiology. The software enables the production independent encoded data transmission under use of the DICOM standard. SecTelMed integrates itself into an available DICOM net

as a DICOM node. While the data transmission is going off invisibly in the background, i.e. the users work with their normal surfaces and programs. The transmission of the data is then carried out via the Internet in the encoded form by using a communication server. This way the data can for certain be exchanged with other communication partners. In our case a SSH- or e-mail-server usually is used as a communication platform.

SSH offers a high safety standard [1]. Quite recently examinations concerning the safety of SSH indicate, that perhaps so-called "man-in-the-middle" attacks on the SSH protocol are possible [2]. The data is therefore additionally encoded according to the Open-PGP standard before the SSH transport [3]. SecTelMed uses the encoding program GnuPG resulting from the OpenPGP project for it [4].

On the SSH Server the data will be only stored in the encrypted form. This ensures the confidentiality of the data even in the case of unauthorized access by a unauthorised person.

The algorithms used by PGP/GPG have been scrutinized by leading cryptography experts who classified them as safe concerning the transfer of confidential data [5, 6]. The Federal Office for Information Security (Bundesamt für Sicherheit in der Informationstechnologie, BSI) judges in like manner [7]. Due to the open source code of the open-source-products any security gaps which might open up while implementing those algorithms into the products PGP/GPG are easily detected and filled [8].

The process of the encoding is also carried out completely transparently for the user in the background of the SecTelMed application.

### 3 Results

The data connection is used for the exchange of examinations at present. On one hand Pre-results can be exchanged between the attending doctors so. On the other hand, the solution gives the possibility of asking the special divisions of the university facilities for a second opinion.

The system in the implementation introduced above has been in use since February 2004. One complete breakdown occurred while updating the operating system otherwise no further major breakdown occurred till today. The conception fits in smoothly into the workflow of the communication partners. The acceptance of the users is also appropriately high and the software is used in daily routine.. This corresponds to the experiences we have won from earlier use of the SecTelMed software for the teleconsultation with the Diakonie-Krankenhaus in Bad Kreuznach [9, 10].

The strategy introduced here has been reviewed by the data security official of Rheinland Pfalz. He has confirmed that the solution corresponds to the data protection laws.

### 4 Discussion

The teleradiology solution introduced above makes a data transmission possible which is compatible with dial-up connections as with leased lines. I.e. no firm IP number is needed on the part of the transmitter like also the receiver. This permits a cost-effective dispatch of digital data under use of the medium Internet. The necessary band width goes by the requirements. In the simplest case the "normal" DSL connection (768/128 Kbytes/s) suffices for use of second opinions [11].

At present, teleradiological connections are still the exception. The telemedical connection of smaller hospitals to special clinics or university hospitals is assessed therefore when advantageous. This brings a competitive edge for the partners involved in the telemedicine process.

It can be foreseen the time when the dispatch of these radiological data alone doesn't suffice any more and also any other medical documents shall be sent out in electronic form. The adjustment of the SecTelMed software to future requirements can be made by the modular construction of SecTelMed any time.

SecTelMed permits already today the manufacturer independent dispatch of not DICOM files (e.g. Word files, PDF data) besides the functionality introduced at this work.

The interoperability still was improved by the implementation of the e-mail telemedicine exchange format of the IT-Working Group (Arbeitsgemeinschaft für Informationstechnik, @GIT) of the Radiological Society of Germany (Deutsche Röntgengesellschaft,

DRG) [12]. With this expansion it is also possibly to build spontaneous contacts with other communication partners. In the simplest case one e-mail program, the encryption software GnuPG/PGP and the public key of the communication partner, suffices a communication between teleradiology partners.

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