



Healthcare – Patient Centric Care

Many healthcare organizations desire to have a patient-centric view of data. Clinicians want to be able to access the data they need, at the desired time and location without using multiple systems or multiple forms of records. A consistent and easy to use method to access data from a single view will make decisions more timely and accurate leading to higher quality care. Unfortunately healthcare organizations struggle to provide this capability to their clinicians. This paper will describe the key challenges of medical data exchange, provide an overview of one means to achieve interoperability and provide example of how an interoperability solution provided a patient-centric view of records.

Today most patient information is stored in disparate systems across the healthcare community—physician offices, imaging clinics, other hospitals—and many of these systems do not interoperate. A practitioner in private practice may have difficulty obtaining complete information about a patient that is currently hospitalized. Or, a practitioner may repeat tests and procedures because he or she does not have prior information about the patient.

In addition to quality challenges manually handled paperwork is expensive to both patients and practitioners, For example, a patient may have to transport a paper copy of the record, have the provider fax it to them, or have the patient record copied to CD. The alternatives are to transport the record manually or proceed with the current patient encounter without prior visit history.

The healthcare industry has been exploring methods of interoperability for years. These approaches have their merit, and a certain degree of standards have been established. The industry's success to date, however, has been slim due to limitations in business models and technology. For example the Community Health Information Networks (CHINs) of the early 1990s did not prosper. At the time technology could not meet

interoperability challenges, was too costly, and not adopted by a sufficient customer base. Furthermore, Regional Health Information Organization (RHIO) models have not been able meet customer needs or obtain sufficient customers to be profitable.

Unlike healthcare, other industries have solved interoperability challenges related to information exchange. For instance, nearly all financial firms use secure “financial exchange” gateways to exchange information among organizations. This capability is now available in the healthcare domain.

Creating interoperability among healthcare systems to seamlessly and easily exchange information in near real time is critical to making meaningful improvements in healthcare delivery. Interoperability is complex and cannot be solved by focusing only on individual standards and quasi solutions. A new approach will remove the complexities associated with interoperability and pave the way for next-generation healthcare.

A New Operating Model for Hospitals

Imagine a healthcare community where access to a patient's medical history is available—from allergies, current medications, medical and surgical history, to MRIs—according to the patient's care requirements. For example, a clinician may only need to view data regarding the patient's prior medication to confirm appropriate treatment. Or, a clinician may need to compare a prior MRI with a current one in real time, and/or with multiple colleagues. In another example, a physician may want order medication from a local pharmacy over a secure, interoperable network.

Across all levels of interoperability, a record of care is created based on a patient-centric view. In this way, healthcare information can be “pushed” to virtually any device, anytime, or anywhere over a secure and flexible network—much in the same way information is pushed to consumers online. Each of these levels requires secure connectivity and standards-based data access. This type of





operating model enables practitioners to access all relevant information to make the best decisions related to their patients' care.

This is where the jointly developed Medical Data Exchange Solution (MDES), from Cisco and Tiani-Spirit has developed a network appliance based approach to delivering interoperability functions. The MDES utilizes a federated architecture, based on IHE frameworks, to deliver a scaleable, standards based and high performance solution to a patient-centric record.

Delivering a Patient-Centric Record - Connecting two hospitals in the federal state of Upper Austria, Austria, Europe:



The *Klinikum Wels-Grieskirchen*, based in Upper-Austria, is the leading health service provider in this region. The catchment area of

the Klinikum is about 600.000 patients and it offers with its 1.300 beds specialized medical treatment on a daily basis, 24h a day.

Klinikum relies heavily upon technology in the provision of patient care and safety, as well as staff productivity. Almost every business process is automated from ordering, to secure discharge summary transmission, and charges.

Klinikum-Wels faced a challenge when it merged with a newly acquired group of hospitals. A migration of two Clinical Information Systems would not only be very costly, but it would impair clinical workflows.

When the two hospital systems of Wels and Grieskirchen merged they faced following challenges:

- Combining two Patient indices of two different Hospital Information Systems
- Providing medical information for every patient independent of patient location

- Accessing the medical record not only in the hospital but also in nearby nursing homes and homecare facilities
- Simplifying the interface for doctors and nurses



Klinikum Wels-Grieskirchen selected the Cisco Medical Data Exchange Solution (MDES) to meet these challenges. The MDES utilizes the strengths of the Cisco network platform and the Tiani-Spirit SpiritEHR to deliver the required interoperability. The MDES was implemented to enable patients data access of records from both hospitals from any location.

The MDES integrated the multiple patient identifiers into a standards based format for cross enterprise patient identify. Local identification data of the patients were sent to the MDES supplied Patient Identification Cross Reference Manager (PIX), which stores the Pat ID's of both facilities and matches them. The matching utilizes rules, which compare different demographic data of the patients. These rules are customizable, to fulfill the requirements of different countries and different languages.

MDES provides a Cross Document Sharing (XDS) repository and registry to store patient documents (e.g., referral and discharge letter, reports, X-ray images). The XDS registry contains the patient identifier and links the documents together across multiple record systems. This creates a virtual patient record and does not require copying data from different sites into a central repository.

If a patient comes to one facility the clerk at the registration desk searches for the patient with demographic data or with a known identifier. The local PIX finds the patient in the local system and also looks up the patient in the regional





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but it needs to be free!“



PIX, where the match with the local PIX of the other facility is located. With this link the access to the documents of the other facility is located. This link provides the documents of the other facility to the medical staff of the hospital, where the patient has his encounter. The MDES utilizes a federated architecture to eliminate the need to copy data between multiple sites. This limits concerns over record disclosures, reduces the needs for large central repositories, and enables the MDES to scale to large environments.

Each site within Klinikum-Wels hosts the MDES on a Cisco Application Extension Platform (AXP) for local connectivity, access and security. The AXP provides a highly scalable, secure and fault-tolerant platform upon which to deliver interoperability services. The Cisco Unified Computing System (UCS) is used at certain locations where high volume transactions or aggregations of data are required. This combination of AXP and UCS provides highly scalable and high performance architecture upon which to meet the demands of a healthcare organization.

With the MDES, Klinikum-Wels created a patient record environment aligned with the workflow requirements of its clinicians. It provided a simple, cost-effective and intuitive means to find records for patients who had been to multiple locations. It eliminated the need for over 1500 proprietary interfaces, which reduced administrative and technical costs. It also delivered the platform upon which Klinikum-Wels can plan migrations of current and future systems in the most cost-effective and minimally disruptive means.

MDES Enables Care Delivery across South Africa

Province of Gauteng, South Africa:



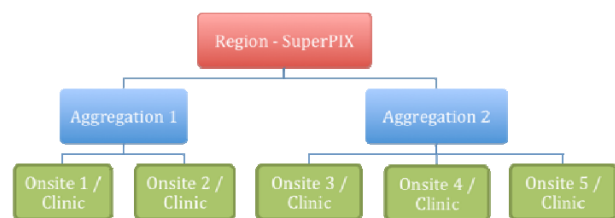
The GDoH (Gauteng Department of Health) decided to install a province wide Electronic Health Record (EHR) for its 11

million inhabitants of the province. This created challenges of delivering care from large cities like Johannesburg, to townships as well as the rural areas. Patients routinely visited multiple sites for their care resulting in a patient having multiple records. Multiple systems and poor infrastructure created a challenging environment to deliver patient-centric care. Tiani-Spirit and Cisco worked together to pilot the delivery of the connectivity and patient-centric record using MDES, Cisco core networking and also satellite and GPRS connectivity.

More than 400 hospitals and clinics are going to be connected within the next 5 years. The MDES hierarchical architecture with offline capability will be used to address areas where connectivity is unreliable, to migrate older systems, and to utilize the network based to load balance demands.

The MDES federated architecture described previously aligned well with the patient care demands of Gauteng Province.

Utilizing the MDES federated and hierarchical approach the patient data is distributed among levels and the documents are retrieved via Cross Community Access framework (XCA). This reduces the need for multiple data stores, reducing costs; and improves performance, saving critical time for clinicians. As depicted below the hierarchical approach aligns data with clinical practice patterns to deliver data to the clinician as needed.



This approach provides the following capabilities and benefits:

- Matching is performed only on the highest level (region or aggregation)
- All systems are synchronized via



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Update Notification

- All patients are registered locally and published into the network for identification of records at other sites
- Changes in patient data is distributed to all systems (LG) concerned
 - Each system (onsite, clinic) is an XDS Domain thus creating fault tolerance and reliability
 - One system can integrate multiple patient indices
 - All patient input transactions are forwarded from clinic -> aggregation -> to region
 - Patient Demographics (PDQ) can be forwarded if there is no result locally: clinic -> aggregation -> region (if the patient is found on a higher level, the patient can be inserted locally)

This architecture and approach will enable the Gauteng Province Department of Health to deliver high quality care across a highly diverse environment. The MDES will eliminate the need for manual transport of records. It will also deliver clinician access to records from multiple sites in a simple and cost-effective manner.

Other Projects:

- ⇒ Tiani-Spirit and Cisco Systems are contributors in the Industry Team of the *epSOS large scale project*, which establishes the Patient Summary and ePrescription / eDispensation services in 12 different European member states.
- ⇒ MDES is also proposed to support the Nationwide Health Information Network and multiple state and local health information exchanges.

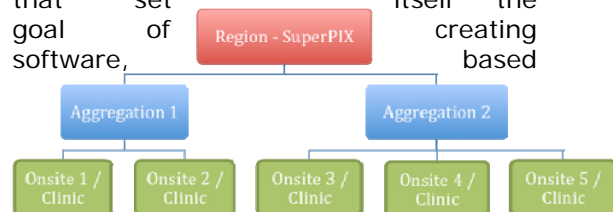
The MDES differentiates itself from competitors by offering a network and standards based approach to interoperability. The Cisco network is able to allocate an application from the network which increases the performance and the benefit of the solution. The hierarchical approach optimizes deployment minimizes the network traffic, and produces the best network performance. The MDES

contains an off-line capability, which guarantees the performance of the system, even if the network has limited or no low bandwidth. It automatically updates the entire MDES environment when a local system reconnects to the network.

Overall the MDES delivers a platform from which a healthcare organization can grow, adapt and align services to meet the dynamic demands of the patient care environment.

About Tiani-Spirit

Tiani "SPIRIT" is a young, dynamic team that set itself the goal of creating software, based



on standards, for the health care sector. Emphasis is placed on the development of reference products based on the IHE guidelines.

After 15 years in the PACS environment, Tiani "SPIRIT" developed a standards based, fully IHE compliant eHR systems, with the main focus on interoperability.

For further information, please see

www.cisco.com



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