SETECS
Secure Transactions and Electronic Commerce Systems

SETECS® Medical Technologies

SETECS® MIX™ System

Secure Medical Information Exchange System

The Current Situation

Despite the potential of Electronic Medical Records (EMR) systems to introduce both costs savings and qualitative healthcare improvements, their adoption by many U.S. healthcare providers has lagged behind advances in information technology capabilities. The results are costly duplication of medical exams, drug prescription complications, errors, fraud, delays in diagnosis, and expensive administrative processing that amount to billions of dollars wasted annually.

Security and interoperability are two the most important constraints to both greater adoption of EMR systems and sharing of data among existing EMR systems. This is largely due to the fragmented nature of healthcare IT services components, the decentralized locations of healthcare data, and the increasing use of mobile devices by healthcare providers. Most EMR systems today are not up to these challenges; they are largely:

- **Proprietary, stand-alone systems** that lack common standards and therefore they are not compatible or interoperable with other systems, and
- **Without strong security and protection** required for sensitive medical data and records.

These existing proprietary systems fail to provide the timely sharing of medical data or easy access to medical records needed by healthcare providers and patients. As importantly, their lack of security beyond simple passwords and SSL protocol can expose sensitive medical data to various threats, unauthorized use and breach of patients' privacy.

The solution to these challenges is an integrated, standards-based, and secure system for collection, storage, processing, distribution, and protection of medical data (secure HIE). It should be used within individual healthcare organizations and also across those organizations at the regional, national, and international levels.

SETECS® MIX™ System

SETECS® Secure Medical Information Exchange (MIX™) System responds to these challenges by securely integrating data from various EMR systems. The system is structured in the form of a large–scale integration and security infrastructure. It can be easily installed, customized, and activated, and its flexible architecture supports the integration, development and operation of a wide range of healthcare applications.

Features of the MIX™ system

The system performs a range of critical functions that support patients, healthcare providers, and other medical institutions:

- ***Reliable and integrated registration*** of patients and professionals;
- ***Authentication*** of patients and professionals using *smart cards* with biometrics technologies;
- ***Integration*** with various EMR systems using HL7, CCR, and CCA standard, collecting and storing medical and all other data in an integrated database;
- ***Distribution*** of such data to all authorized individuals within individual medical institutions;
- ***Authorized transfers/sharing*** of data and documents between institutions;
- ***Distributed searching and retrieval*** of data and documents.

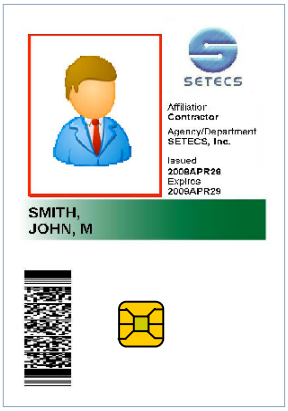
MIX™ System Advantages

- MIX™ is based on relevant medical IT standards (HL7, CCR, CCA, etc.);
- The system provides strong security for patients and professionals issuing and using biometrics smart cards;
- MIX™ components may be used in hospitals, small medical units, or specialized institutions at the regional, state or national level;
- Security of the MIX™ system is very comprehensive and is based on strong security technologies and standards, including smart cards, PKI, secure Web services, secure XML documents, single sign–on tokens, and biometric authentication (FIPS 201) protocols;
- The MIX™ system can be easily extended to interoperate with any EMR system supporting HL7 standard messages;
- Individual components of the MIX™ system are simple to install and activate, enabling easy scaling to new institutions and users.

SETECS® MIX™ Smart Cards

The SETECS® MIX™ system issues MIX™ *Security* smart cards to healthcare providers and MIX™ *Medical* smart cards to patients. Both types of cards contain an "applet" that is compliant with the Federal Government's FIPS 201 Personal Identity Verification (PIV) standard. The PIV applet contains the card owner's identification data, two fingerprints, photo and four digital certificates used for authentication purposes. In addition, MIX™ Security smart cards for professionals contain role-based data and other security credentials necessary to determine access to sensitive medical information. MIX™ Medical smart cards also contain a personal medical history, including data on allergies, medications, specific diseases, insurance, and other medical conditions. Data in the medical applet are encrypted and accessible only with the patient's consent.

The layout of the Security card is compliant to the Federal FIPS 201 (PIV) standard:



Medical card may be customized for individual (institutional) card issuers:

Components and Functions

MIX™ System in A Hospital

The MIX™ system in a hospital has six components: three servers, collectively called the MIX™ Server and three types of stations: an Administrative, Smart Card, and Medical station.

The three servers of the MIX™ hospital system are the following:

MIX™ Administrative Server - is used to register the institution, its organizational units, locations, and facilities, and to register personnel and patients. It also handles communications with the Group (Regional) Server, as explained in the next section.

MIX™ EMR Interface Server - receives HL7 messages from the various EMR systems used in a hospital and stores data in the MIX™ database.

MIX™ Web Portal is a Web interface to the MIX™ database and distributes information from the MIX™ database to Medical Stations.

The three types of MIX™ hospital stations are the following:

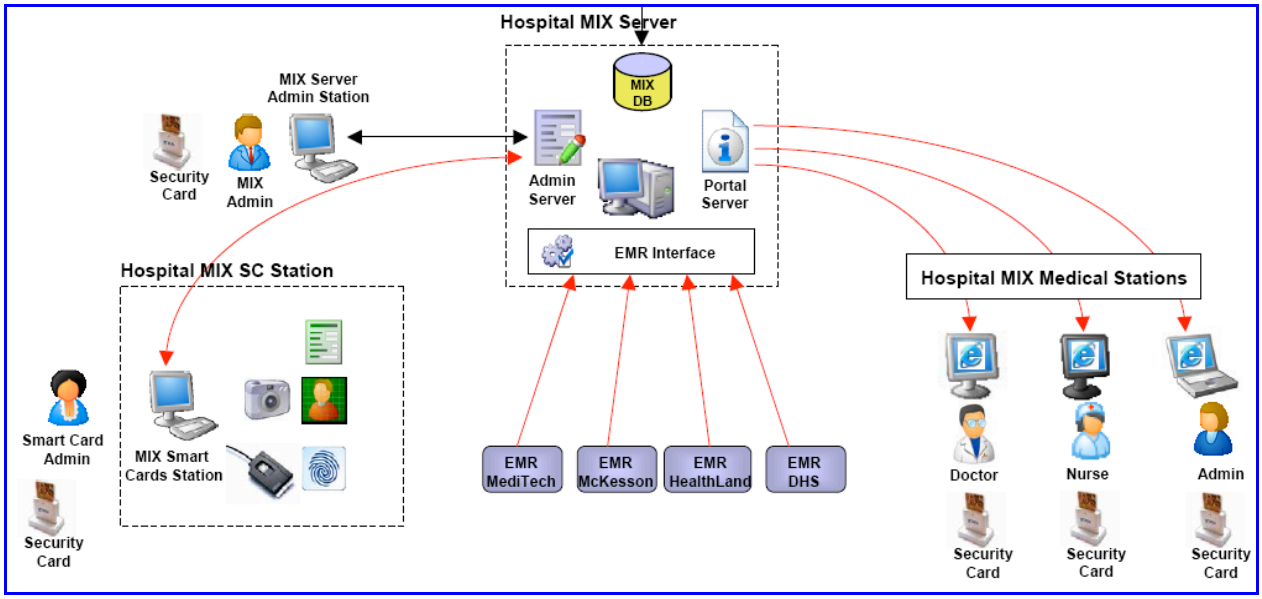
MIX™ Administrative Station – providing a graphical interface to the MIX™ Server for MIX™ administrators.

MIX™ Smart Card Station is used to register personnel and patients, to enroll them for smart cards (capturing two fingerprints and a photo), to create requests for smart cards, and to manage issued cards.

MIX™ Medical Station - a PC with Internet Explorer and special MIX™ software as an interface between a browser and Security smart cards, which are used for identity authentication, network login (single sign–on), and verification of authorization roles.

For patients' cards, the MIX™ Medical Station displays a patient's demographic and medical data stored in the card.

Not shown in the Figure below is an additional SETECS® Security Server, which provides the Identity Management (IDMS), Certificate Authority (CA), and XACML Authorization services.



MIX™ Infrastructure

In order to support the exchange of data and documents, cross-referencing of patient records, synchronization of HL7 tables and various security functions, the MIX™ system is organized as a three–level functional infrastructure. The Hospital MIX™ server lies at the bottom of the infrastructure. Above it, linking multiple hospital MIX™ servers is a ***Group*** or ***Regional MIX™ Server***. At the highest level is a single, ***Global MIX™ Server*** that links Group servers below it.

Group (Regional) MIX™ Server

The Group Server is equivalent to the Hospital MIX™ server, except that it performs a "bridging" function between hospital MIX™ servers located within a group or in a region. The Group Server receives data and documents from local hospital MIX™ servers for patients transferred to another institution and forwards the information to the receiving institution. It also creates and maintains a cross–referencing index of multiple proprietary patient indices and correlates them with a global, unique MIX™ patient ID, which is assigned in accordance with the PIV (FIPS 201) standard.

Global MIX™ Server

At the third level of the MIX™ infrastructure is a unique Global MIX™ Server managed by SETECS®. When a patient is transferred from a hospital in one region to a hospital in another region, data is transferred via the Global MIX™ Server. This server handles several other functions common to the MIX™ infrastructure: issuance of unique personal identifiers, distribution of master copies of HL7 coding tables, Root PKI certificate management, and global MIX™ authorization policy enforcement.

Benefits of the MIX™ System

By enabling the secure exchange and sharing of electronic medical records, the SETECS® MIX™ System provides a wide range of benefits to patients, healthcare professionals, medical institutions, third-party payers, and other participants in the healthcare system.

Benefits for Patients

- Improved quality of medical services.
- Shorter time required for administrative processing and fewer duplicate exams.
- Increased security and protection of personal medical data.

Benefits for Professionals

- Elimination of diagnostic delays.
- More complete medical data enhances decision-making support.
- Decreased administrative burden means more time for and with patients.

Benefits for Medical Institutions

- More efficient and effective services provide a competitive advantage.
- Increased revenue cycle management capabilities reduce reimbursement delays and increases cash flow.
- Improved patient processing lowers administrative costs.

Benefits for Payers and Other Participants

- Increased efficiency and effectiveness of services lowers overall healthcare costs.
- Improved quality and availability of data enables outcome-driven care and pay for performance.
- Increased access to comprehensive medical data supports improved public health policy-making and more effective interventions.

Additional Information

Dr. Sead Muftic
5801 Nicholson Lane, Suite #1233
North Bethesda, MD 20852, U.S.A.
Tel: +1–240–535–2095
E-mail: info@setecs.com, **Web:** medical.setecs.com