

:: IMSS EHR & VistA Implementation ::

VistA Community Meeting
Robert Morris University
Pittsburgh, PA
June 29th, 2006



Contact Information

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:: Mexico & IMSS Facts ::



INSTITUTO MEXICANO DEL SEGURO SOCIAL
SEGURIDAD Y SOLIDARIDAD SOCIAL

Mexico

- 1,964,375 km² total territory
- 31 States, 1 Federal District
- (Capital: México, Distrito Federal)
- Total population (2000): 97,483,412
- Annual population growth rate (1990-2000): 1.85%
- Urban population (2000): 74.6%
- Population density (2003): 53.0 Hab/Km²
- Life expectancy: 68.5, males; 74.7, females
- Ethnic groups: 60% mestizos (Amerindian-Spanish) ; 30% amerindian; 9% white; 1% other



IMSS is a unique Social Security institution...

- It employs 380,000 workers and has a seventeen Billion USD annual operating budget.
- Aside from providing disability and retirement pensions to 3 million people, similar to those provided by the Social Security Administration in the United States, it also offers medical services for around half of all Mexicans, that is, over forty five million people.
- In addition, IMSS provides day care centers for working women and cultural and sports facilities for affiliated workers.
- Lastly, the IMSS is Mexico's second largest Tax Authority, after the Finance Ministry, collecting annually over ten billion dollars in Social Security contributions.



IMSS' quick facts

Quick Facts

- Daycare centers with a population of over 150,000 children.
- 1 out of every 3 children in Mexico is born at IMSS.
- 25% of all medical research country-wide.
- 37% of all hospital beds.
- 74% of all Kidney Transplants.
- 76% of all Heart Transplants.
- 65% of all Pancreas Transplants.
- 2nd largest collection authority (Approx. 9.5 BUSD).

Medical Units

- 1st Level (primary care)	1,200
- 2nd Level (community hospitals)	223
- 3rd Level (tertiary/educational)	40

Covered Population

• Workers	15,130,640
• Beneficiaries (relatives)	27,098,612
• Pensioned and Relatives	3,643,151
• Total	45,872,403



:: Electronic Health Record ::



EHR in MEXICO

IN MEXICO THERE ARE SEVERAL INDEPENDANT EFFORTS TOWARDS AND ELECTRONIC HEALTH RECORD. THE CURRENT TREND IS THE INTEGRATION OF STANDARDS SUCH AS HL7, CDA AND DICOM .

Ministry of Health

- Disperse efforts in several Medical Facilities in the country.
- Currently analyzing a standardization process.



Private Medical Centers

- Clínica Lomas Altas: Ambulatory Patient Care + PACS
- Clínica Londres: EHR System
- Hospital Ingles: PACS
- Hospital ABC: EHR + PACS



ISSSTE

- Tele-medicine services being developed.
- Deploying an appointment control system.



IMSS

- HL7, CDA and DICOM standards are adopted.
- State of the art technological infrastructure being used: Unisys ES7000 Orion as central repository, BEA WebLogic 8.1
- 1000+ Medical Units online by end of 2006.
- Medical Imaging Centralization project currently under development to be tied into the EHR.



Similar Scenarios

Investment

Reach

Achievements



United States of America

Served population: 295,000,000¹

Impl. due date: 2014²

Est. investment: 600 BUSD³

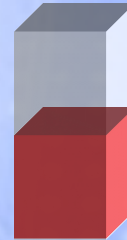


United Kingdom: NHS

Served population: 60,400,000¹

Impl. Due date: 2010⁴

Est. investment: 20 BUSD⁵

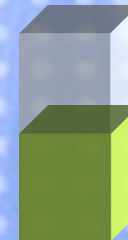


Canada: Canada Health Infoway Inc.

Served population: 16,400,000^{1 & 6}

Impl. due date: 2009⁶

Est. investment: 1.3 BUSD⁷

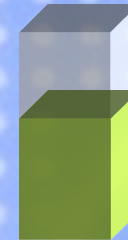


IMSS

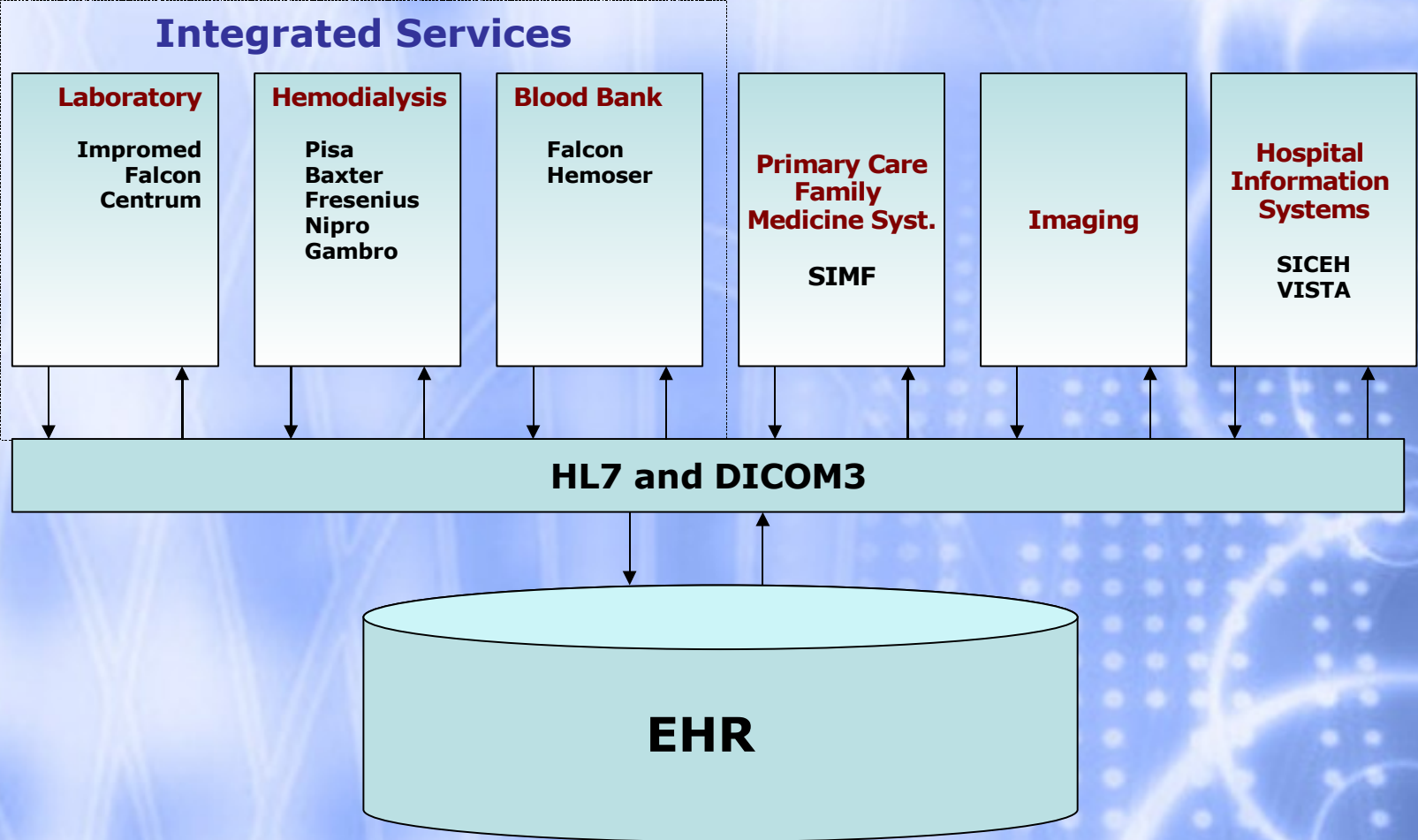
Served population: 45,872,403

Impl. due date: 2006

Est. investment: 102 MUSD



Integration



IMSS Electronic Health Record

- o The electronic health record project will centrally host the clinical information generated by all services provided by IMSS:
 - **1st Level** – Family Medicine Units (1,200+)
 - **2nd Level** – General and Regional Hospitals (223)
 - **3rd Level** – Highly Specialized Medical Units (40)
- o The objective is to have a **unique** EHR for every IMSS user that will last for their whole life time.
- o It will be **available** in any time and place connected to the IMSS network.
- o IMSS EHR will **enhance** and **expedite** the healthcare services provided by the Institute.

Expediente Clínico Electrónico usado por: DIEZOCANA,ALEXIS (11.254.16.3)

HERNANDEZ CALVA,JORGE 1197782880 (M) 9780R / SOCIO-ESPECIALIDADES BLOQUE A / ARCOS ZAMORA,MAGALLY
Médico Titular: DIEZOCANA,ALEXIS

Últimas 100 Notas Firmadas

- RE: Nueva Nota en Progreso
- Jun 17,05: IMSS - NOTA DE REFERENCIA
- May 19,05: IMSS - NOTA DE URGENCI
- May 19,05: IMSS - NOTA DE URGENCI
- Abr 11,05: IMSS - NOTA DE EVOLUCI
- Ma 11,05: IMSS - VALORACION PRE

IMSS - NOTA DE REFERENCIA URGENCIAS
Adm: 17/02/05: SOCIO-ESPECIALIDADES BLOQUE A Jun 17,2005@17:38 Diezocana,Alexis

INSTITUTO MEXICANO DEL SEGURO SOCIAL
DIRECCION DE PRESTACIONES MEDICAS

NOTA MEDICA EN URGENCIAS-CONTRARREFERENCIA

Hospital: SX11-ESPECIALIDADES BLOQUE A
Médico Tratante: DIEZOCANA,ALEXIS
Nombre del Paciente: HERNANDEZ CALVA,JORGE
IDEE: HEC37804011CXEETA1
NSS: 1139782880
Agregado Médico: 3419780R

FECHA Y HORA: Jun 17, 05@17:38

SIGNOS VITALES

Peso: 65.0 15/04/2005@15:46
Talla: 170.0 15/04/2005@15:46
Temperatura: 37.0 C 15/04/2005@15:46
Frecuencia Respiratoria: 25 15/04/2005@15:46
Frecuencia Cardíaca: 80 15/04/2005@15:46

DATOS DEL HOSPITAL QUE RECIBE

MOTIVO DE ENVIO

DATOS CLINICOS RELEVANTES

IMPRESION DIAGNÓSTICA INICIAL

TERAPEUTICA EMPLEADA

Expediente Clínico Electrónico usado por: DIEZOCANA,ALEXIS (11.254.16.3)

HERNANDEZ CALVA,JORGE 1197782880 (M) 9780R / SOCIO-ESPECIALIDADES BLOQUE A / ARCOS ZAMORA,MAGALLY
Médico Titular: DIEZOCANA,ALEXIS

Diagnósticos Activos

- NEUMONIA DEBIDA A OTROS MICROORGANISMOS INFECCIOSO
- * Neumonía Debida A Mycoplasma Pneumoniae
- * Colera, No Especificado

Alergias/Reacciones Adversas

- ACETAMINOFEN

Alertas

- ALERGIAS

Medicamentos Activos

- ACICLOVIR TABLETA PENDIENTE
- ACIDO ZOLEDRONICO TABLETA PENDIENTE

PrevenIMSS

Fecha de Vencimiento

No hay recordatorios

Resultados de laboratorio recientes

Signos Vitales

Temp.	F.C.	F.R.	T.A.	Est.	Peso
37.0 C	60	25	110/78	170.0 cm	65.0 kg
15 Abr, 05	15 Abr, 05	15 Abr, 05	15 Abr, 05	15 Abr, 05	15 Abr, 05

Citas/Visitas/Admisiones

Fecha	Hora	Estancia Hospitalizada	ESPECIALIDAD
27 Abr, 2005	13:07	Estancia Hospitalizada	SIXI-ESPECIALIDAD
27 Abr, 2005	11:22	Estancia Hospitalizada	SIXI-ESPECIALIDAD
27 Abr, 2005	11:13	Estancia Hospitalizada	SX11-ESPECIALIDAD
17 Feb, 2005	11:58	Estancia Hospitalizada	SX11-ESPECIALIDAD

Hoja Inicial | Diagnósticos | Medicamentos | Indicaciones | Notas | IntelConsultas/Procedimientos | Notas de Egreso | Laboratorio | Reportes | Expediente Central | Notas de Enfermería | Admisiones



IMSS Electronic Health Record

- o IMSS EHR will also consolidate a tremendous **knowledge database** that will support research, education and administrative activities.
- o Data will be consolidated from the different clinical applications that IMSS uses such as:
 - The Family Medicine System (**SIMF**)
 - The Ambulatory Appointment System (**SICEH**)
 - The Hospital Information System (**IMSS-Vista**)
 - The different treatment and diagnostic auxiliary services systems.

- o Starting operation date: **April 2004.**
- o Approximate investment: **102 MUSD.**

Estudios de Laboratorio. Aguascalientes // U. M. F. No. 1 Aguascalientes (101)
 Paciente: Reyesw ESPIN, Emmanuel - N° SS: 7777777 - IDEE HECJ7804011GXE6TA1

Regresar 20-Noviembre-2004

Estudio: datos adjuntos

Componente	Valor	Observaciones
CONTROL NUMBER identificación.CLAIMS ATTACHMENT	grave, muy grave	TX_OBSERVACIONES1
identidad del médico primario	grave, muy grave	TX_OBSERVACIONES1

Estudio: grupo de pruebas.análisis de orina

Componente	Valor	Observaciones
pruebas analíticas en orina	grave	TX_OBSERVACIONES2

Estudio: hematología

Componente	Valor	Observaciones
fragmentos	grave	TX_OBSERVACIONES2
hemoglobina A	grave	TX_OBSERVACIONES2
monocitos/100 leucocitos	grave	TX_OBSERVACIONES2

Estudio: ingresos y egresos.ingresos.molecular

Componente	Valor	Observaciones
ingreso de líquidos.tubo torácico	grave	TX_OBSERVACIONES2
número de inventario de la institución	grave	TX_OBSERVACIONES2

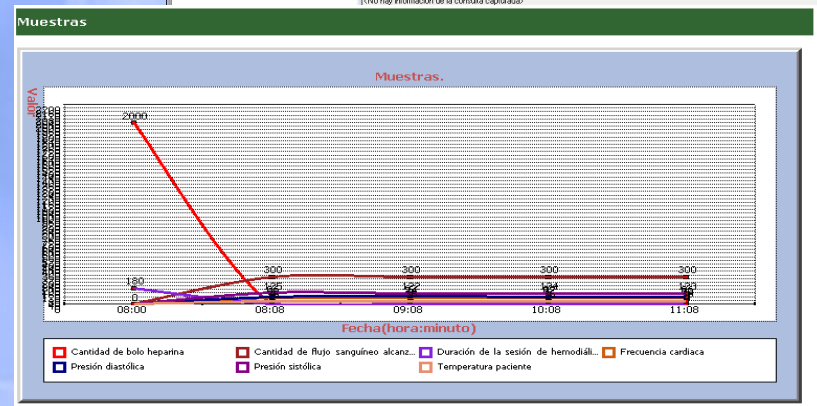
Estudio: trinucleótido genético

Componente	Valor	Observaciones
gen AR.repetición de CAG	grave	TX_OBSERVACIONES2
gen FRDA.repeticiones GAA	grave	TX_OBSERVACIONES2

80 15/04/2005@15:46 TERAPEUTICA EMPLEADA

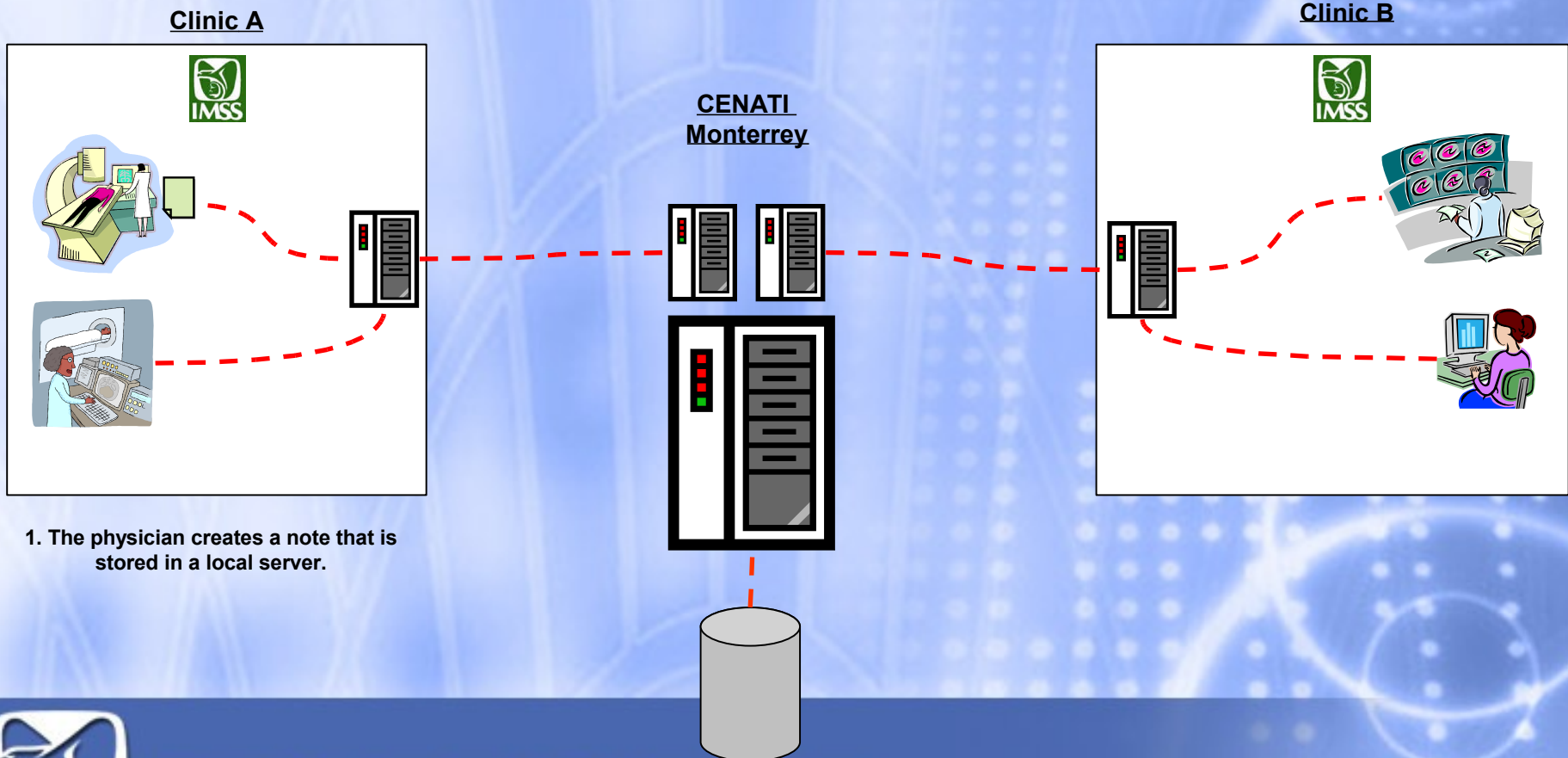
Tensión Arterial 110/78

(No hay información de la consulta capturada.)



IMSS Electronic Health Record

IMSS EHR ALLOWS THE INFORMATION INTERCHANGE BETWEEN CLINICS AND HOSPITALS NO MATTER THEIR SIZE OF GEOGRAPHIC LOCATION.



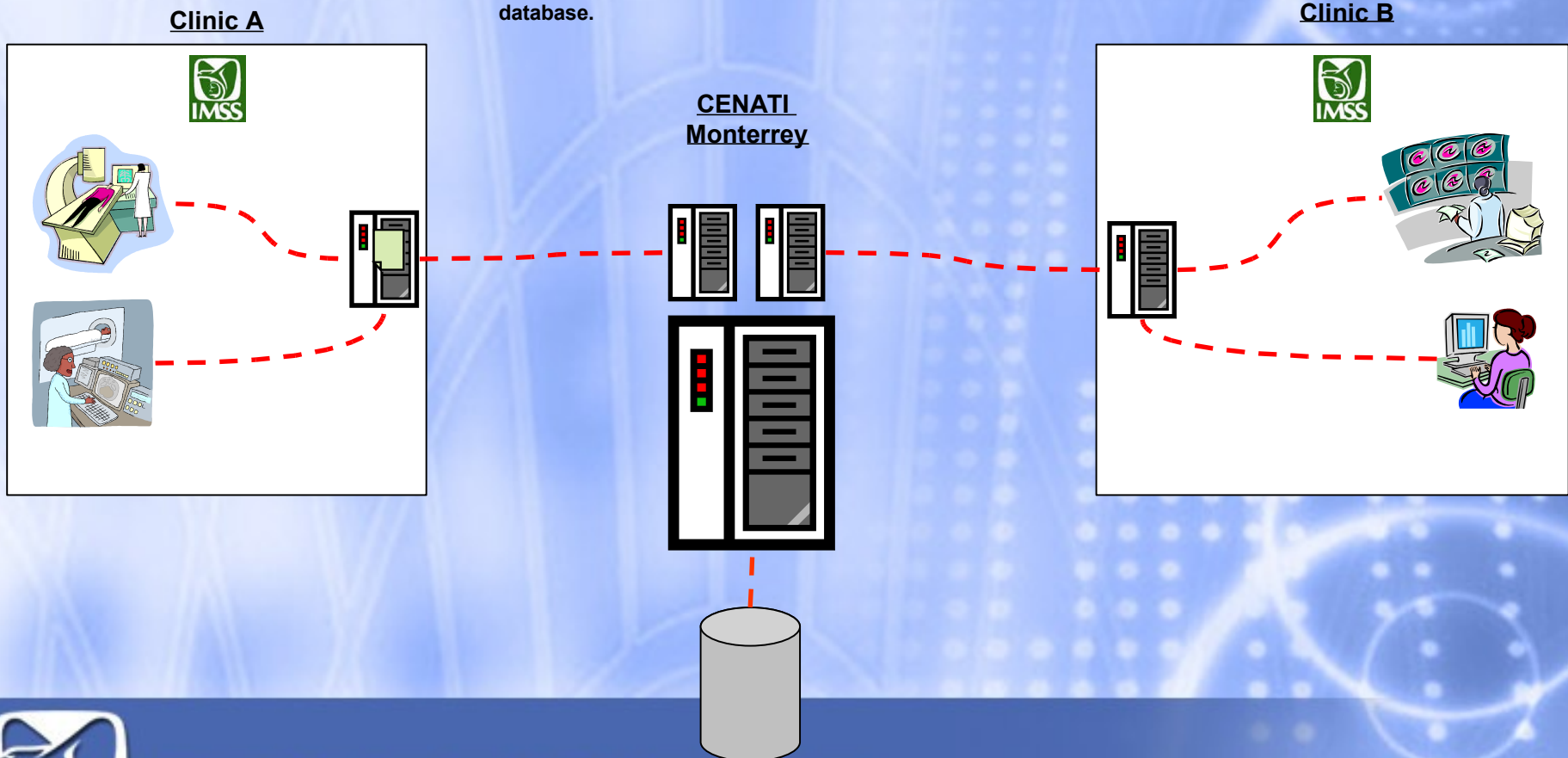
1. The physician creates a note that is stored in a local server.



IMSS Electronic Health Record

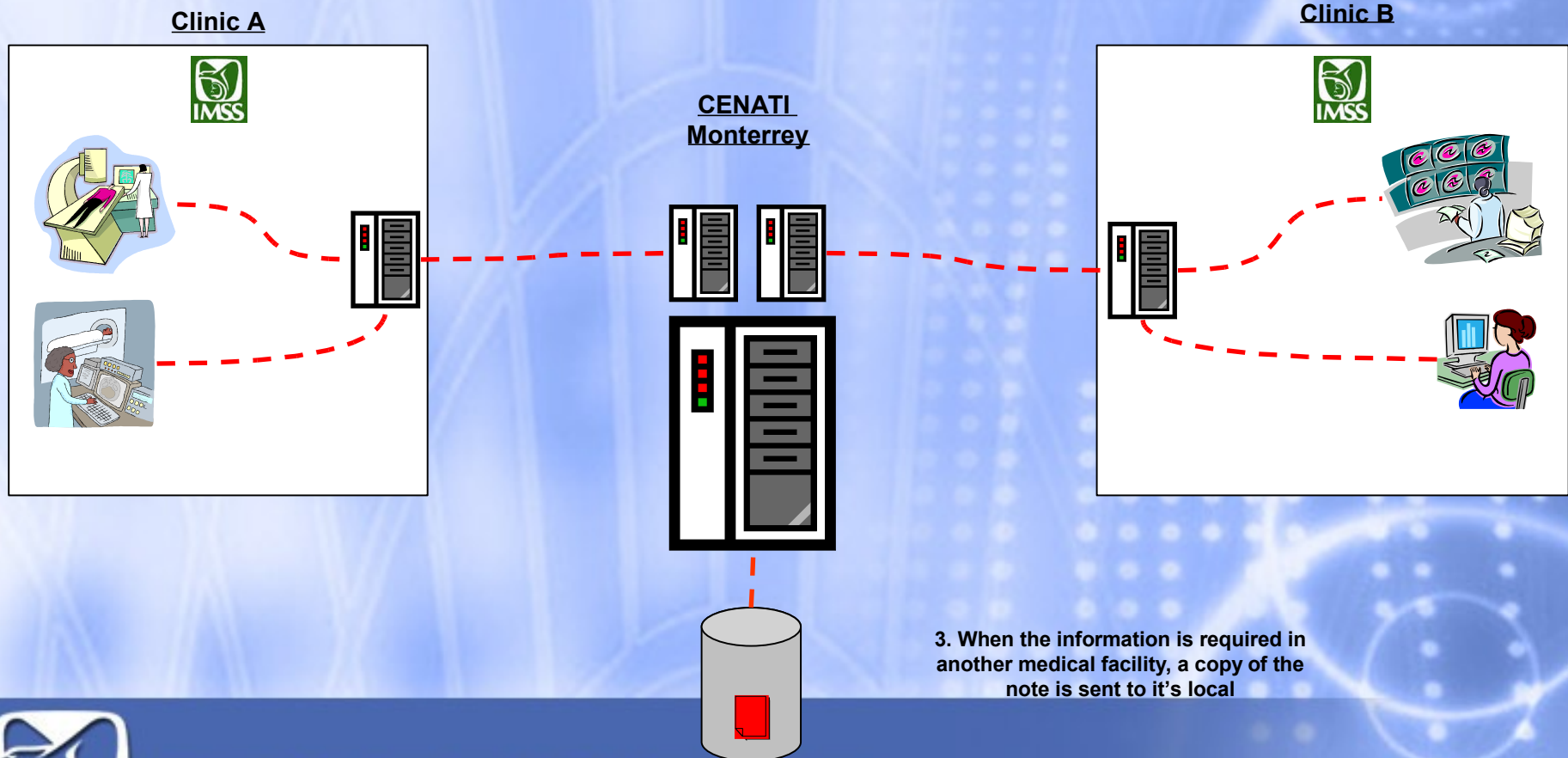
IMSS EHR ALLOWS THE INFORMATION INTERCHANGE BETWEEN CLINICS AND HOSPITALS NO MATTER THEIR SIZE OF GEOGRAPHIC LOCATION.

2. The note is sent to the IMSS EHR in an HL7 file and is stored in a database.



IMSS Electronic Health Record

IMSS EHR ALLOWS THE INFORMATION INTERCHANGE BETWEEN CLINICS AND HOSPITALS NO MATTER THEIR SIZE OF GEOGRAPHIC LOCATION.



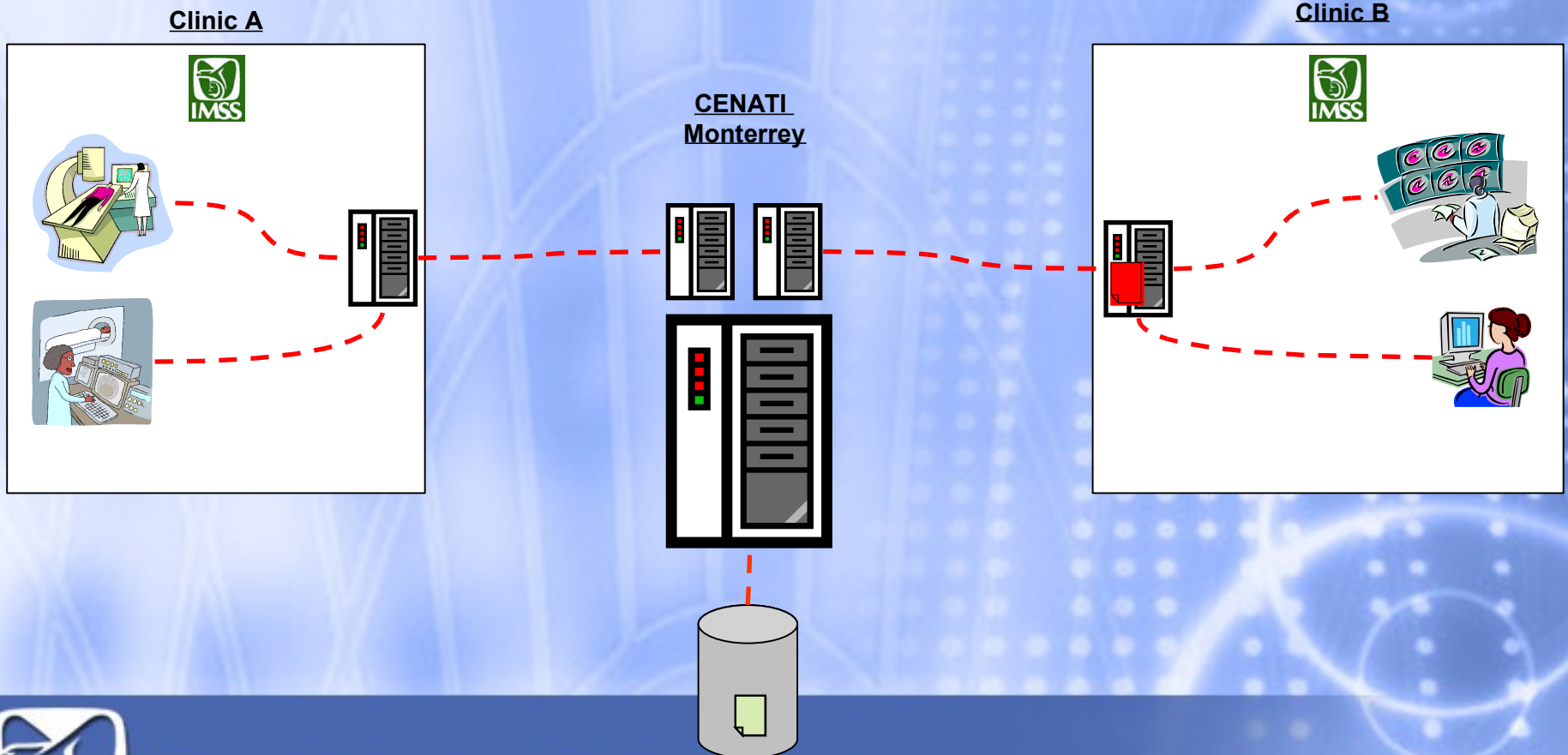
3. When the information is required in another medical facility, a copy of the note is sent to it's local



IMSS Electronic Health Record

IMSS EHR ALLOWS THE INFORMATION INTERCHANGE BETWEEN CLINICS AND HOSPITALS NO MATTER THEIR SIZE OF GEOGRAPHIC LOCATION.

4. The note is then seen by the personnel that requested it.



Use of standards by the EHR project

o HL7

- Health Level 7 is a standard used to provide a comprehensive framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information that supports clinical practice and the management, delivery and evaluation of health services. Specifically, to create flexible, cost effective standards, guidelines, and methodologies to enable healthcare information system interoperability **and sharing of electronic health records**.



o CDA

- Clinical Document Architecture is a defined complete document which can include text, images, sounds and any other multimedia information.

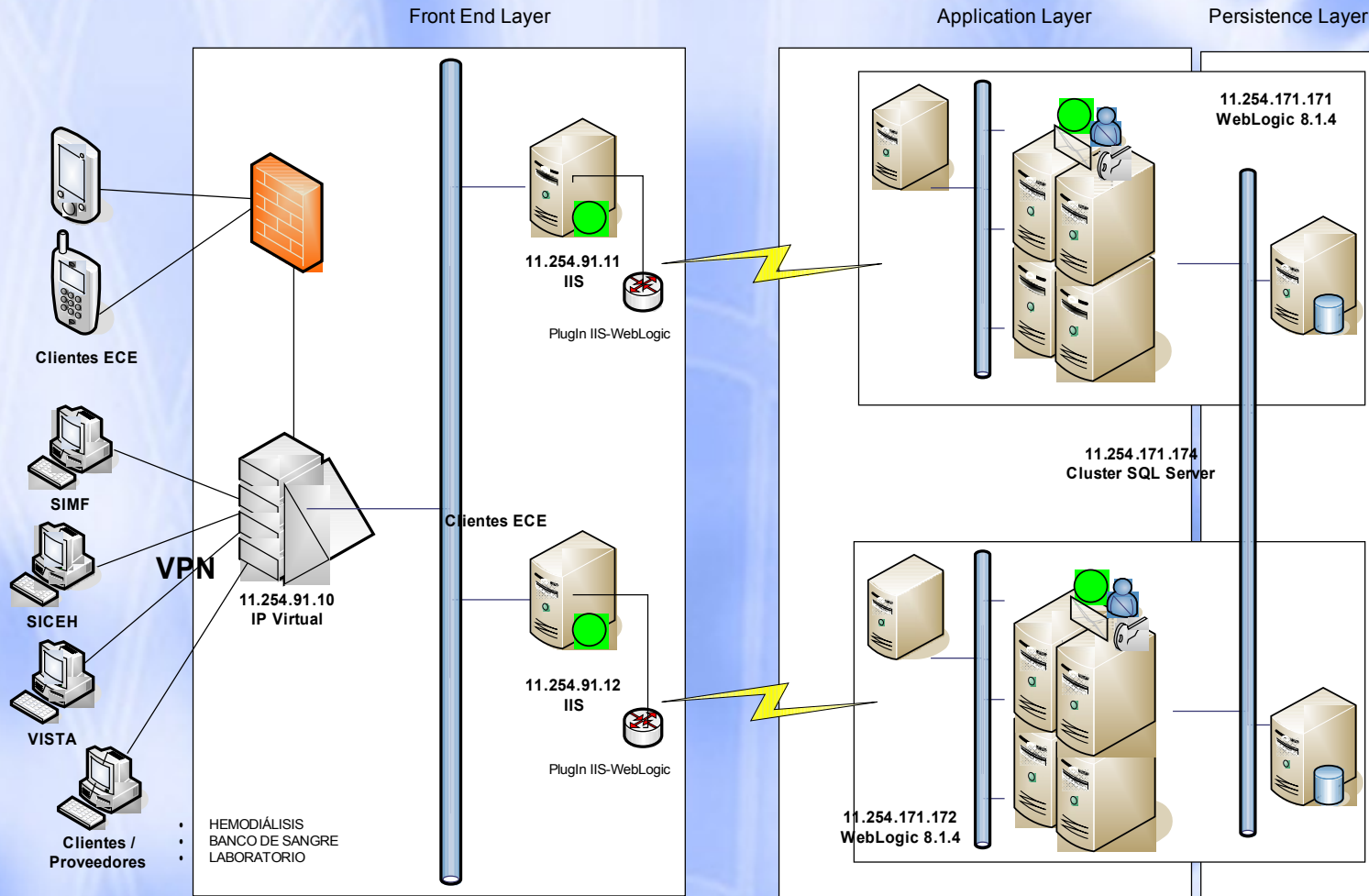


o DICOM

- Digital Communications in Medicine (DICOM) for interoperability the distribution and view of medical images.
- Describes the structure, file formats and specification of information of an image and the header required, describing a common language to different medical systems.



Architecture



Architecture

- o The Design of the technical platform was based on six main concepts to achieve full functionality:
 - Security
 - Interoperability
 - Completeness
 - Portability
 - Durability
 - Policy Compliance (NOM 168A, IMSS 111A)
- o Context
 - To capture faithfully the original meaning of information and preserve the medical-legal integrity: containers, content and context.

The following operations are supported. For a formal definition, please review the [Service Description](#).

- [Operation 1](#)

This web service is using <http://tempuri.org/> as its default namespace.

Recommendation: Change the default namespace before the XML Web service is made public.

Each XML Web service needs a unique namespace in order for client applications to distinguish it from other services on the Web. <http://tempuri.org/> is available for XML Web services that are under development, but published XML Web services should use a more permanent namespace.

Your XML Web service should be identified by a namespace that you control. For example, you can use your company's Internet domain name as part of the namespace. Although many XML Web service namespaces look like URLs, they need not point to actual resources on the Web. (XML Web service namespaces are URIs.)

For XML Web services creating using ASP.NET, the default namespace can be changed using the WebService attribute's Namespace property. The WebService attribute is an attribute applied to the class that contains the XML Web service methods. Below is a code example that sets the namespace to "http://microsoft.com/webservices/".

```
C#  
[WebService(Namespace="http://microsoft.com/webservices/")]  
public class MyWebService {  
    // implementation  
}
```

Visual Basic.NET

```
<WebService(Namespace="http://microsoft.com/webservices/")> Public Class MyWebService  
    ' implementation  
End Class
```

For more details on XML namespaces, see the W3C recommendation on [Namespaces in XML](#).

For more details on WSDL, see the [WSDL Specification](#).

For more details on URIs, see [RFC 2396](#).



Facts on the EHR technological platform

- Level of availability of 99.5%.
- Interoperability platform implemented in a UNISYS ES7000 Orion enterprise server.
- RAID Architecture to warranty availability of data.
- IMSS EHR front-end is using Network Load Balancing.
- Disaster Recovery Plan designed to work in an alternate location.
- Implementation of industry security standards such as WS Security, WS Addressing and WS RM.
- Platform is able to process up to 180 TPS with a normal operation scheme of 80 TPS.
- ISO 9001:2000 Quality System implemented and certified in December 2005.



Microsoft



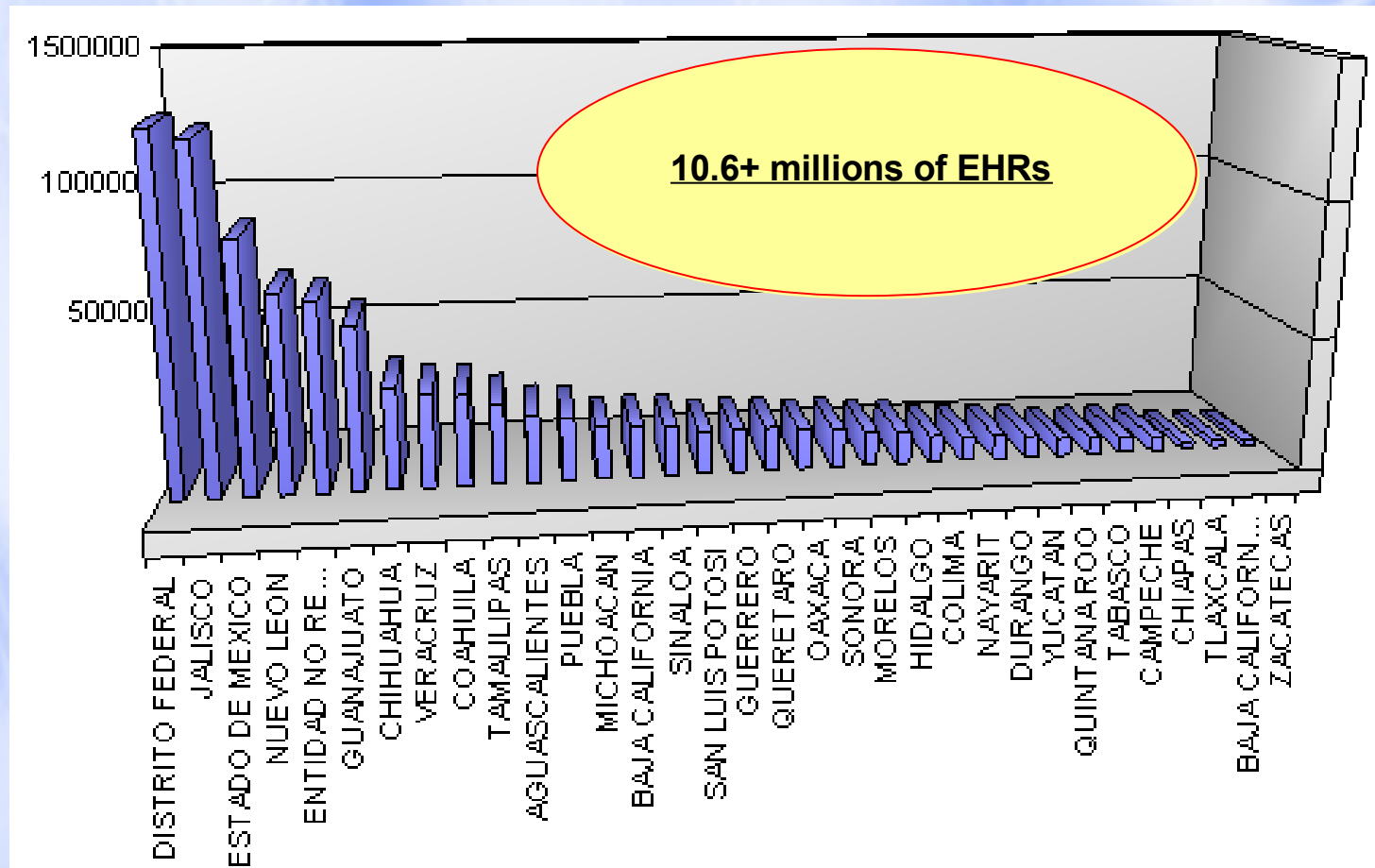
Achievements

o IMSS EHR has registered the following information:

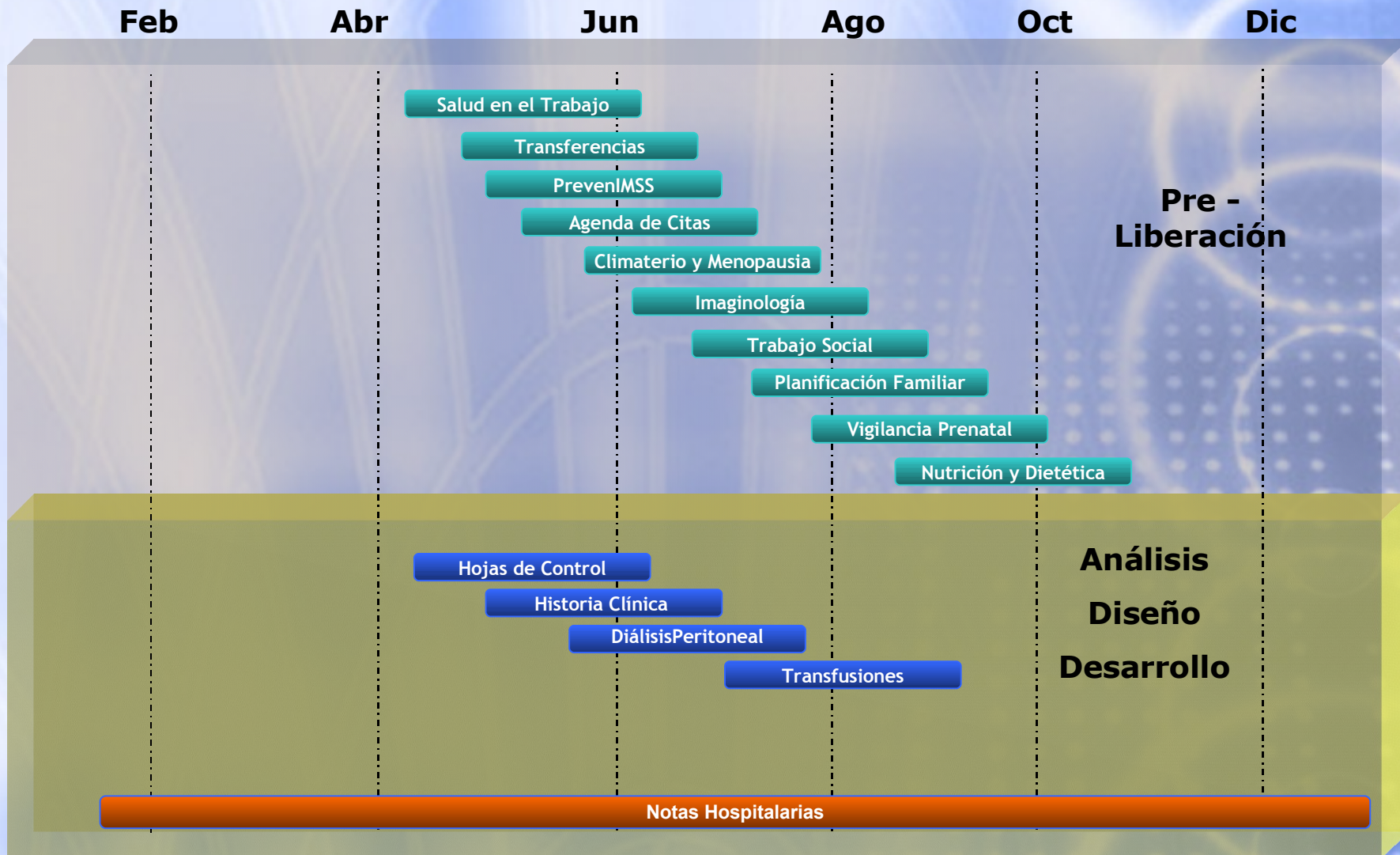
- Hemodialysis (320,000 sessions)
- Laboratory (10.4 million studies)
- Blood Bank (65,000 orders)
- Medical Notes (30 million – *clinical notes only*)
- Incapacities (52,300 + 570 cancellations)
- Stomathology (8,336 studies)
- Pharmacy (160,000 prescriptions)



Achievements



Achievements



2006 Goals

IMSS EHR PROJECT HAS SET THE FOLOWING GOALS FOR 2006

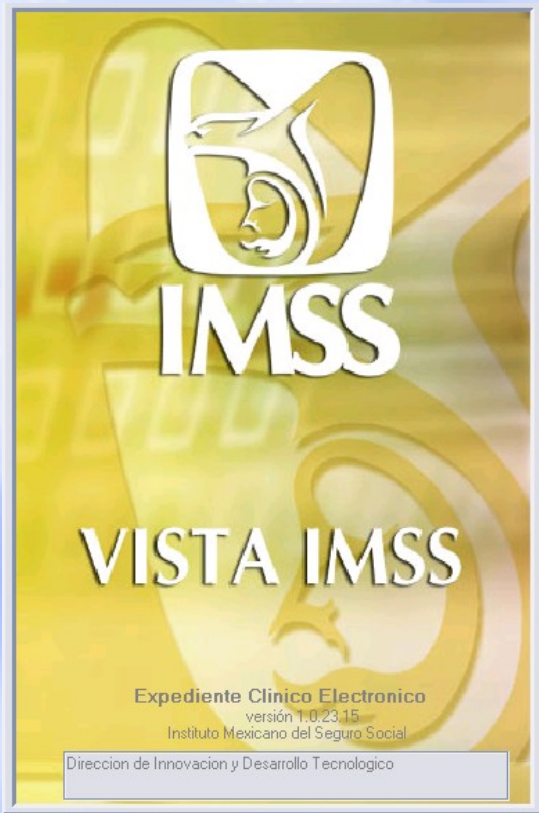
- o Centralization of information of more than 1,000 Family Medicine Units, 70 Secondary Level Hospitals and 25 Highly Specialization Medical Units.
- o Complementing the high availability scheme of the architecture by implementing a geo-cluster.
- o Platform modification in order to support messaging transactions via SSL.
- o Integration of digital signatures in the HL7 messaging operations.
- o CMM Level 3 certification for the messaging development process.



**:: IMSS-Vista
Hospital Information System ::**



•Description



SPLASH SREEN OF THE LOCALIZED VERSION OF CPRS

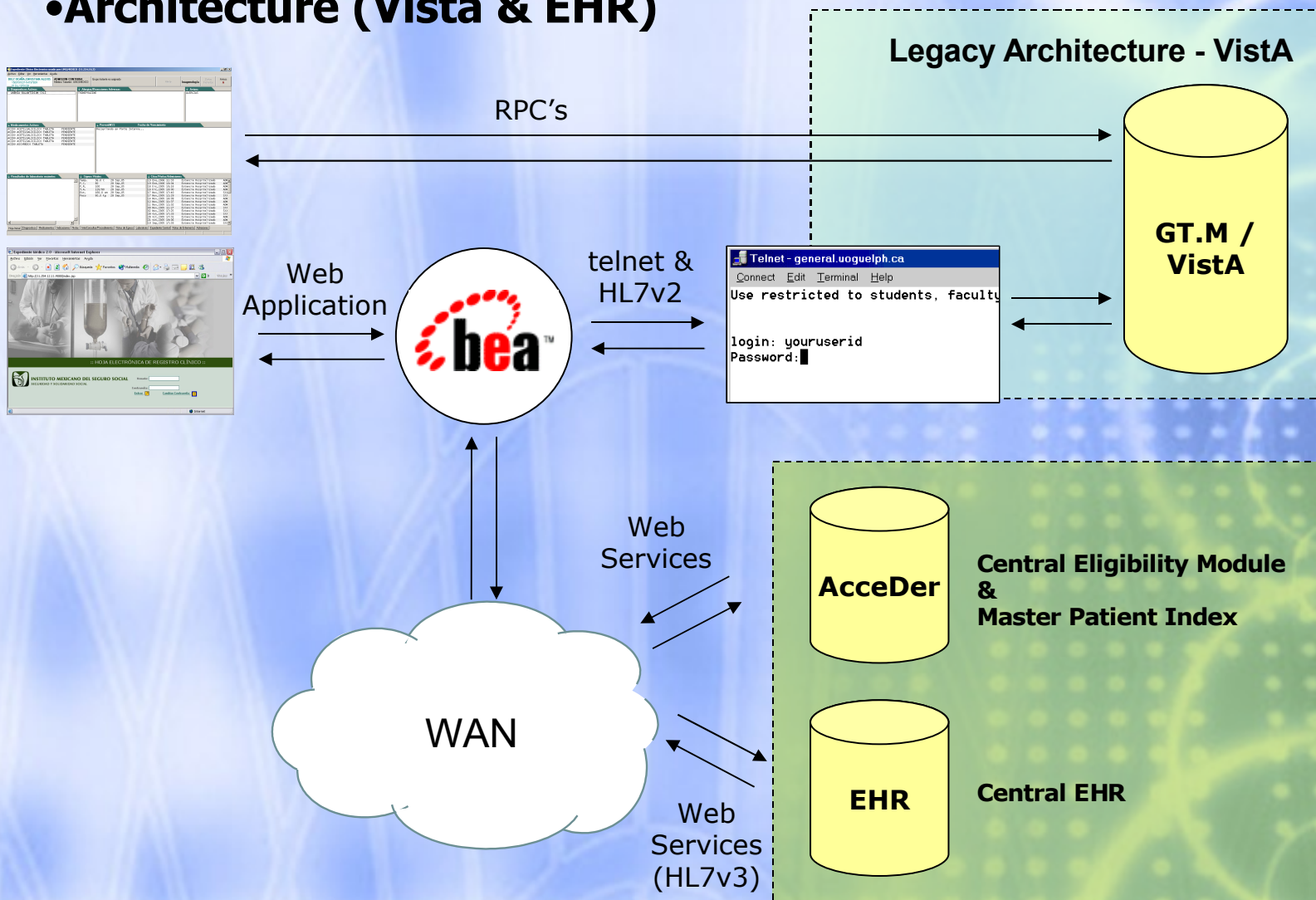
IMSS HAS ADOPTED THE WORLD-WIDE RECOGNIZED US VETERAN AFFAIRES' VISTA SYSTEM AS THE HOSPITAL INFORMATION SYSTEM TO BE USED AT IMSS HOSPITALS.

IMSS HAVE LOCALIZED AND MODIFIED VISTA'S FUNCTIONALITY TO MEET HOSPITAL REQUIREMENTS, ALSO HAVE ADDED NEW FUNCTIONALITY, FOR EXAMPLE:

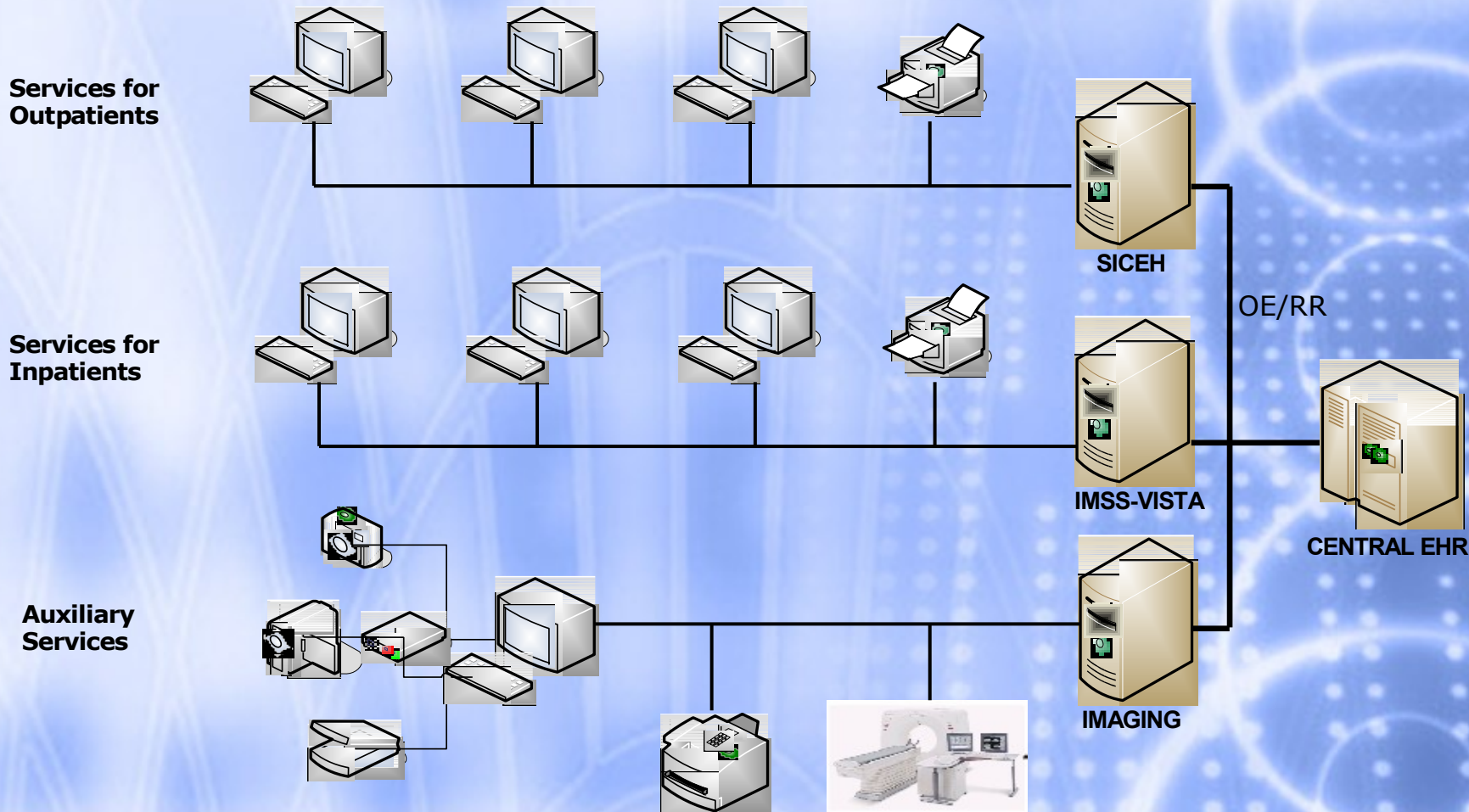
- Web-interfaces for modules that originally were text-based.**
- Integration to the existent IMSS systems like: Central EHR, Pharmacy and Lab results.**



•Architecture (Vista & EHR)



•Architecture (HISes & RIS)



•New web interfaces

○ PATIENT REGISTRATION.

- A completely new web user interface for patient registration, uses web services to check eligibility and demographics if patient already has EHR.

○ ADMISSION/TRANSFER/DISCHARGE

- A completely new web user interface for bed control (Vista's ADT module), uses web services to check eligibility and demographics if patient already has HER, and to receive Admission Orders from SICEH.

○ EMERGENCIAS (ADT)

- A completely new web user interface for patient admission into Urgency Service, similar to ADT but with enhancements to match IMSS business model.

http://11.254.16.3:7001 - Contenedor de Aplicacion - Microsoft Internet Explorer

Salir

MEDICA,ASISTENTE Servicio: ADMISION CONTINUA (URGENCIAS)
jueves, junio 23 de 2005, 15:01:35 Unidad: SXXI- H. ESPECIALIDADES

REGISTRAR DERECHOHABIENTE EN ACCEDER

NSS: 1500791037

Apellido Paterno: Paciero Apellido Materno: Paciero

Nombre: Nombre Fecha de Nacimiento (dd/mm/aaaa): 08/06/1979

Sexo: Masculino Femenino

Aceptar Cancelar

Soporte Términos y Condiciones de Uso

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Internet

http://11.254.16.3:7001 - Contenedor de Aplicacion - Microsoft Internet Explorer

Salir

MEDICA,ASISTENTE Servicio: ADMISION CONTINUA (URGENCIAS)
jueves, junio 23 de 2005, 14:52:01 Unidad: SXXI- H. ESPECIALIDADES

Paciente

Nombre Completo: DIEZ OCAÑA,CHRISTIAN ALEXIS
NSS: 1500791037 Agregado Médico: 1M19790R
Fecha de Nacimiento: 01-12-1979 Edad: 25 Sexo: M
UMF: NO ASIGNADA Consultorio: N/A Turno: NO TIENE

ADMISSION HOSPITALARIA

Fecha de Admisión: 11/06/2005 Hora: 14 Minuto: 51

Diagnóstico: DIAGNOSTICOS Hospital: SXXI-ESPECIALIDADES BLOQUE A

Cama: A3-319 Especialidad: NEUROLOGIA

Médico tratante: NUÑEZ FUENTES,CRISTINA Fuente de Admisión: SERVICIO DE URGENCIAS

Aceptar Cancelar

Soporte Términos y Condiciones de Uso

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Listo Internet



•New CPRS modules

o CENTRAL EHR INQUIRY

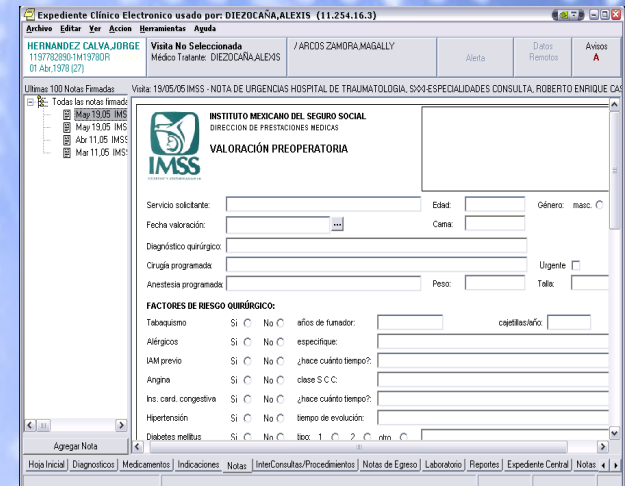
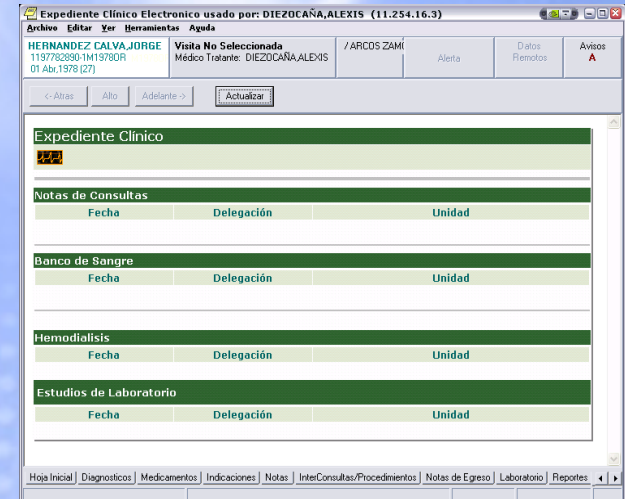
- Provider can consult patient's central EHR and see all clinical notes, lab results, haemodialysis sessions and blood transfers made at other IMSS facilities.

o CLINICAL NOTES

- Clinical notes with rich format and coded fields (no just free text). Also we developed a graphic environment to design additional clinical notes in a easily and quickly fashion, as soon as the new design is saved it is available within CPRS.

o EMERGENCIAS (CPRS)

- A completely new module (accessible through a CPRS tab). Providers at Emergency Rooms have an interactive screen that permits the capture patient's information like: Glasgow scale, ISS, RTS, TRISS, AO code (in case of fractures), a body/skeleton map to locate burns/fractures. This information is reported within a clinical note called "HOJA FRONTAL DEL SERVICIO DE URGENCIAS".



•New CPRS modules

o NURSERY

- A completely new module (accessible through a CPRS tab). Has been designed to meet IMSS Nurses needs. Nurses can receive provider's orders and follow up clinical attention within CPRS.

o SURGERY

- A completely new module (accessible through a CPRS tab). Has been designed to meet IMSS Surgery needs: Scheduling, Surgery Clinical Note and automatic reports to a central IS.

o DIRECT COMMUNICATION TO LEGACY HIS

- A completely new CPRS tab used to retrieve information from a legacy HIS that has been used for the last 10 years (necessary for patients with chronic diseases).



•Challenges (Development)

○ **LEARNING CURVE**

- MUMPS.
- VISTA code (heterogeneous styles of coding).
- GTM.

○ **INSTALATION & INITIAL CONFIGURATION**

- VA's documentation assumes previous knowledge of VISTA and there's no guide to install and bring VISTA up and running.
- Developers community documentation is based on particular distributions with particular pre-configuration.

○ **TRANSLATION**

- Translate into Spanish text embedded in the MUMPS code.
- Understand effects of replace VA's catalogs with IMSS catalogs.

○ **CUSTOMIZATION**

- Understand required configuration and pre-loaded information for each VISTA process (Registration, Admission, etc.) in order to adjust it to IMSS process.



•Challenges (Deployment)

○ **AUTHORIZATION**

- Assign/Exercise budget to deploy the system.

○ **INFRASTRUCTURE**

- Cabling (power & network).
- Remodelling working areas.

○ **EQUIPMENT**

- Acquire and install PC and printers.

○ **ACCEPTANCE AND PARTICIPATION**

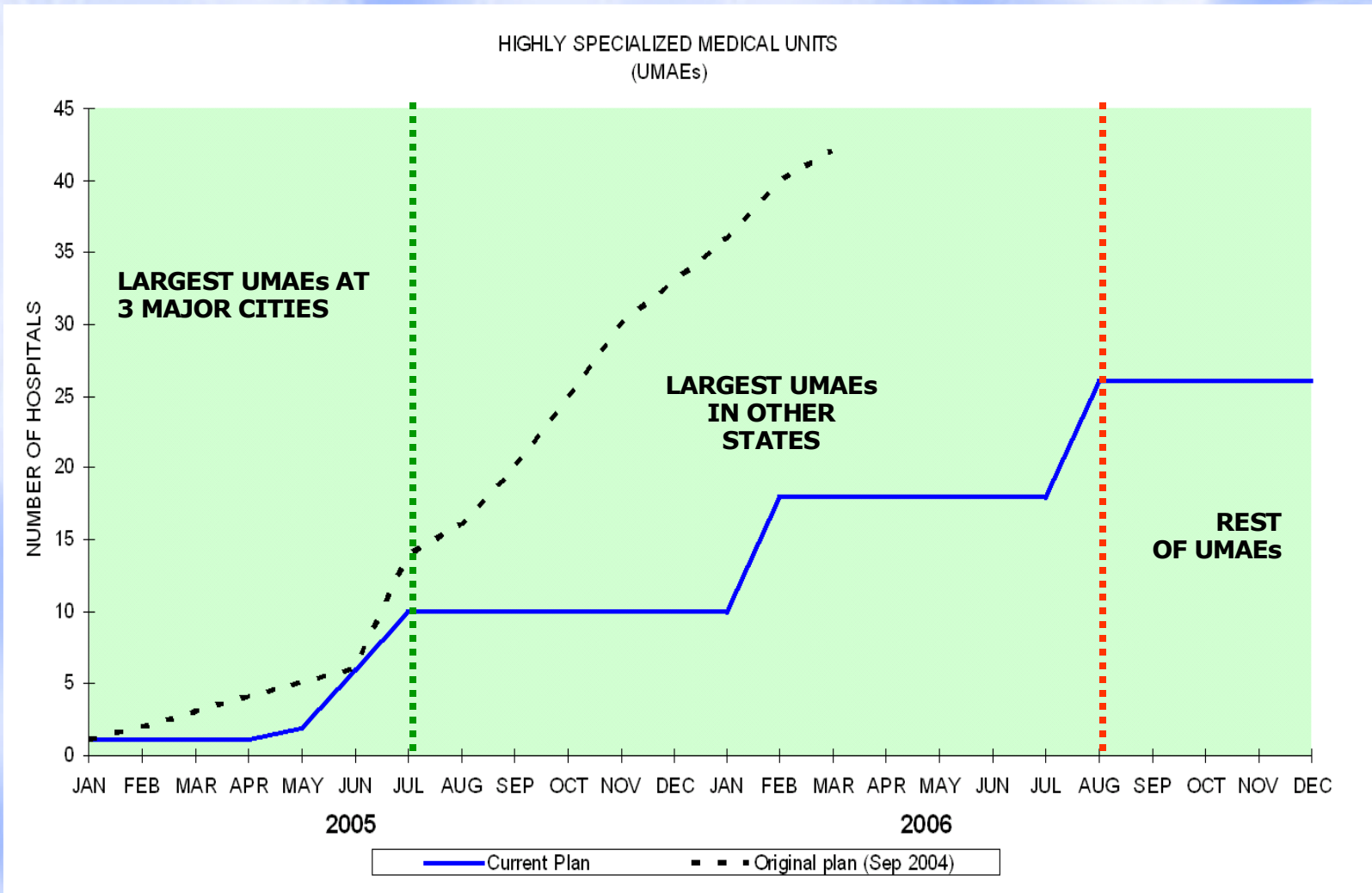
- Get Hospital Board committed with the project.

○ **TRAINNING AND ON-SITE SUPPORT**

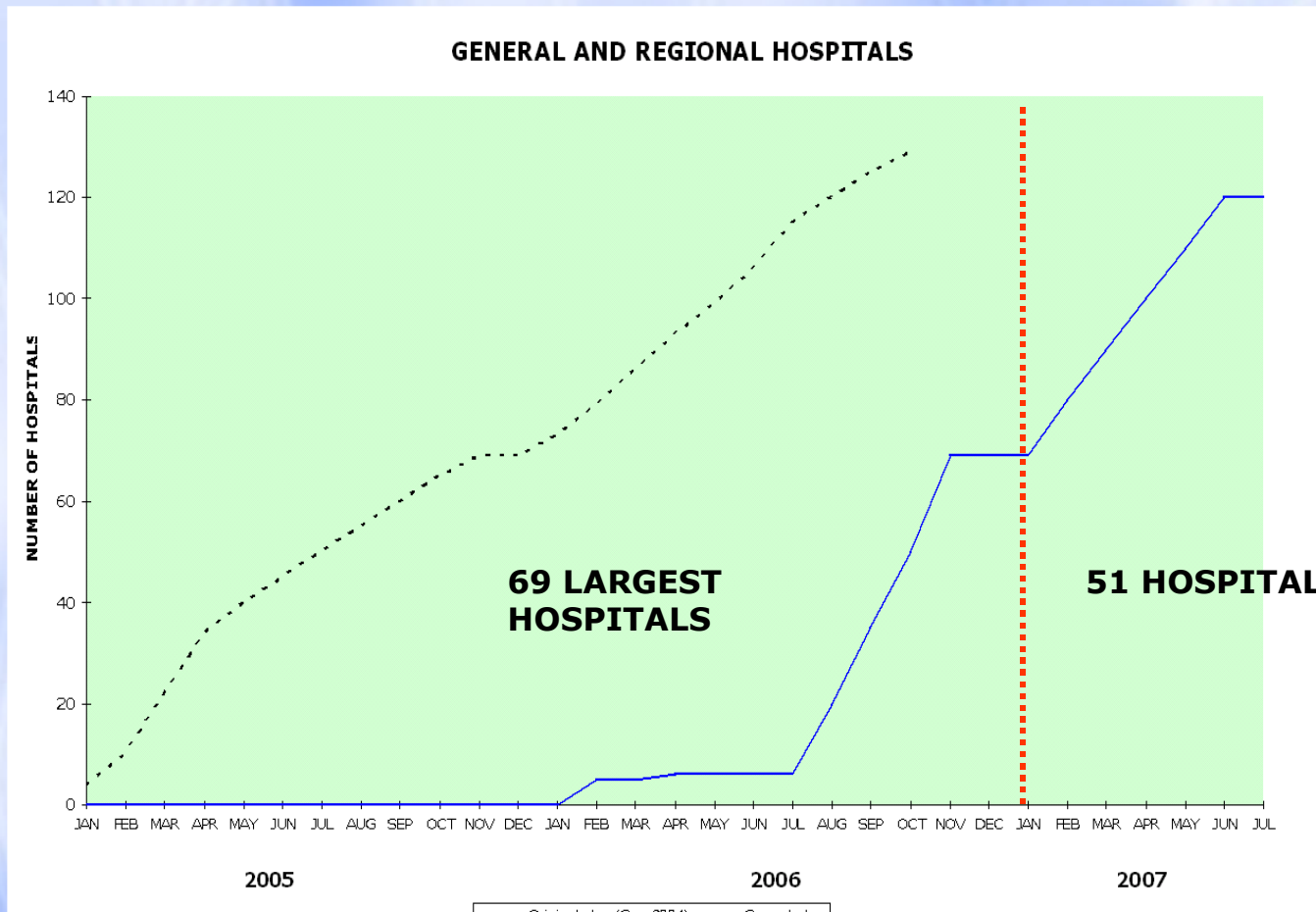
- Train personnel (administrators and users).
- Support users on-site during early stage of adoption.



•Deployment



•Deployment



Thank you



INSTITUTO MEXICANO DEL SEGURO SOCIAL
SEGURIDAD Y SOLIDARIDAD SOCIAL

Sources:

- 1- Central Intelligence Agency; “The World Factbook”; 2006; website: www.cia.gov/cia/publications/factbook/.
- 2- Thompson G., Brailer D., "The Decade of Health Information Technology: Delivering Consumer-centric ar"; julio de 2004.
- 3- Middleton B.; “The Value of Healthcare Information Exchange and Interoperability”; 2004.
- 4- HIMSS; “Standards Insight”; Noviembre de 2004; website: www.himss.org/content/files/StandardsInsight/2004/11-2004.pdf
- 5- Brewing B.; “Latitudes and Longitudes”; Government Health IT; 21 de febrero de 2006; website: www.govhealthit.com/article90744-09-12-05-Print
- 6- Canada Health Infoway; “Who we are”; 2006; website: www.infoway-inforoute.ca/en/WhoWeAre/Overview.aspx.
- 7- Canadian Healthcare manager, “The Electronic Health Record. Are We Making The Grade?”; 2005; website: www.chmonline.ca/images/June2005/ehr.pdf

