

Implementation of an IHE ATNA-Based Electronic Health Record System

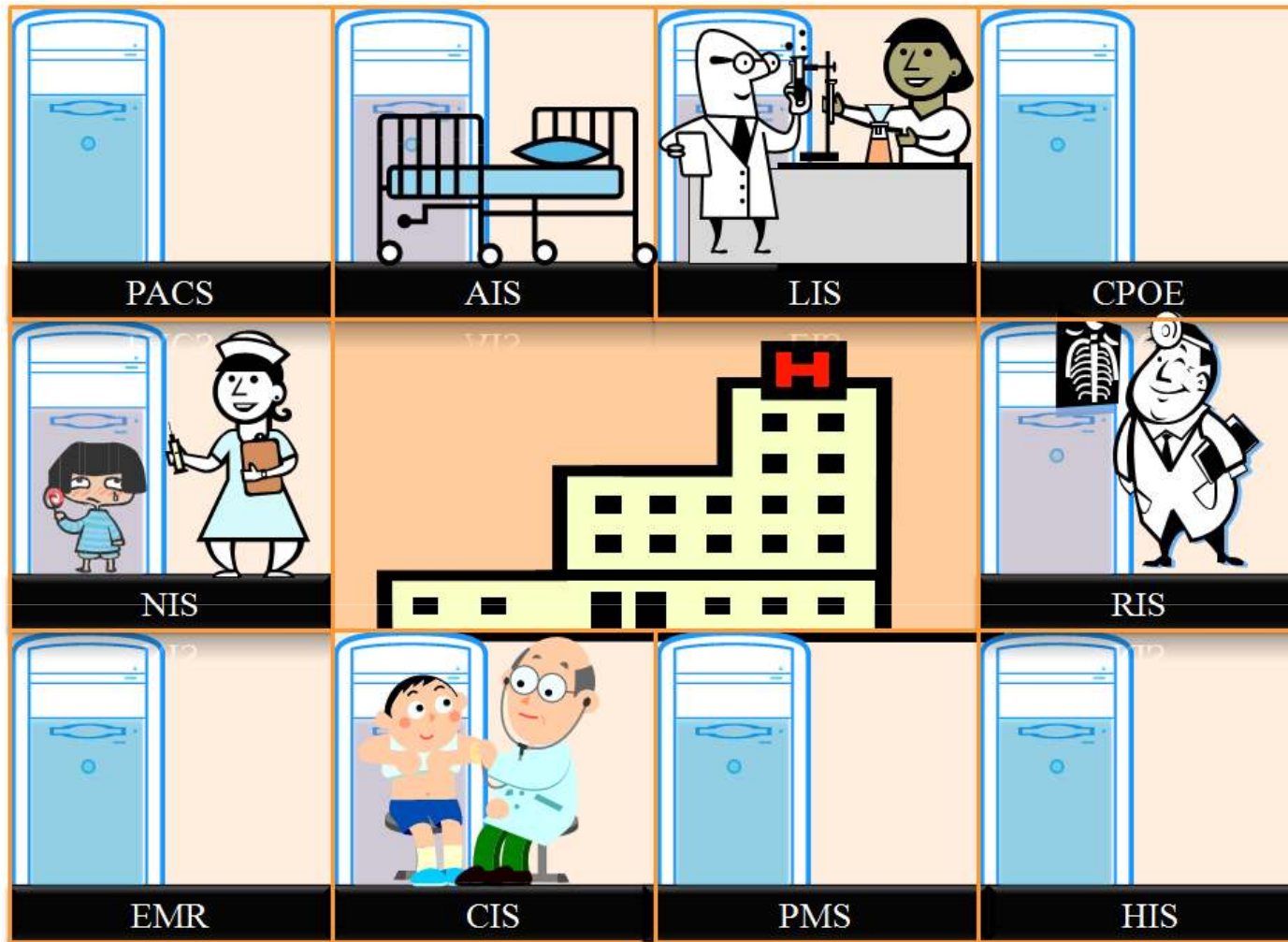
Tai-Ling Tsai¹, Mei-Lien Pan², Der-Ming Liou¹

¹Institute of Biomedical Informatics, ²Institute of Public Health

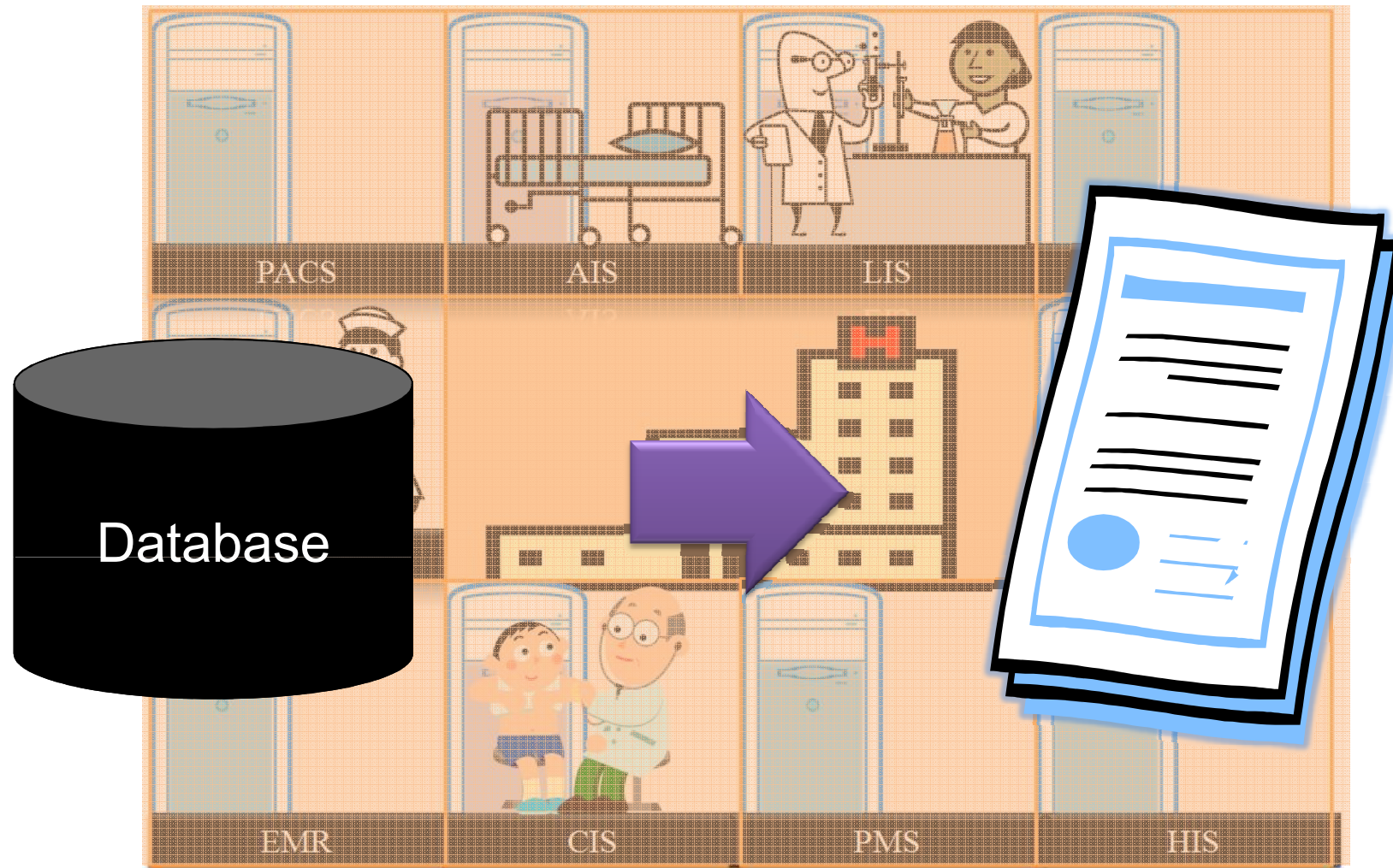
National Yang-Ming University

Presenter : Tai-Ling Tsai

Date :2009/05/08



The appearance of the Electronic Health Record has improved the heavy and complicated procedure .



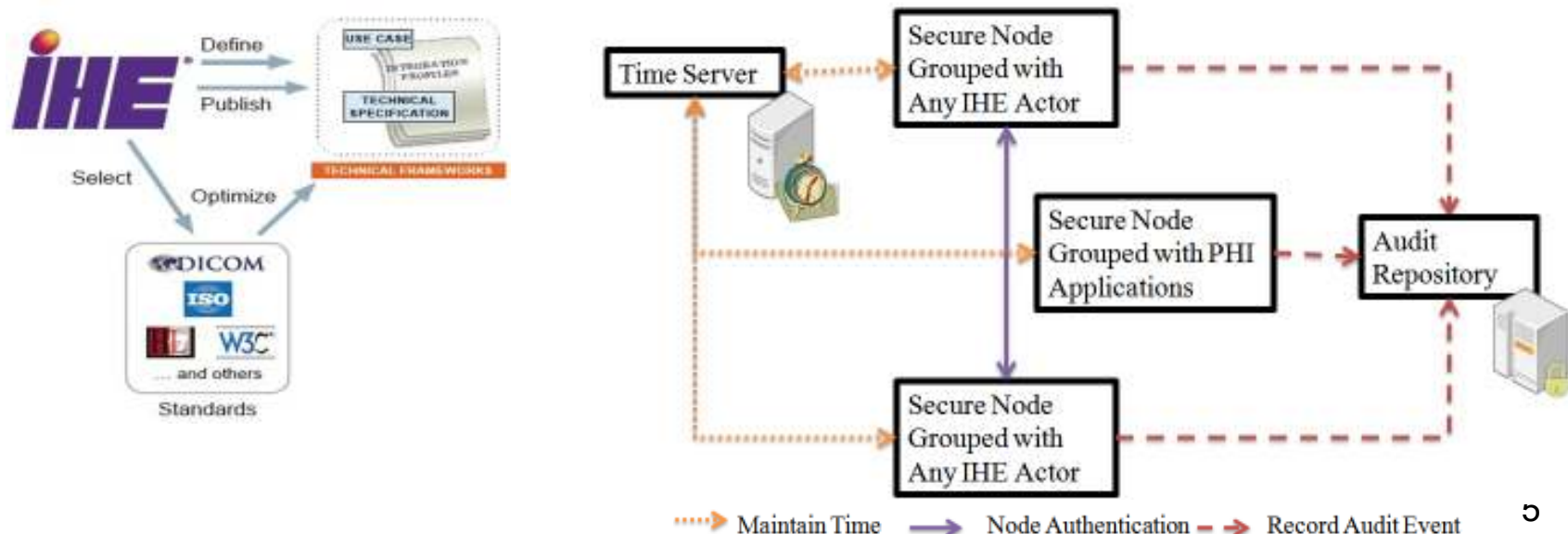
The appearance of the Electronic Health Record has improved the heavy and complicated procedure .

Background

- The users may interest in EHR
 - Patients
 - Health care providers
 - Other: insurers, family members, ...
- Health Insurance Portability and Accountability Act (HIPAA)
 - Protected health information
- Ensuring the accuracy, integrity, and quality of the record
 - Consistent definitions for Professional roles, patient consents , and audit logs

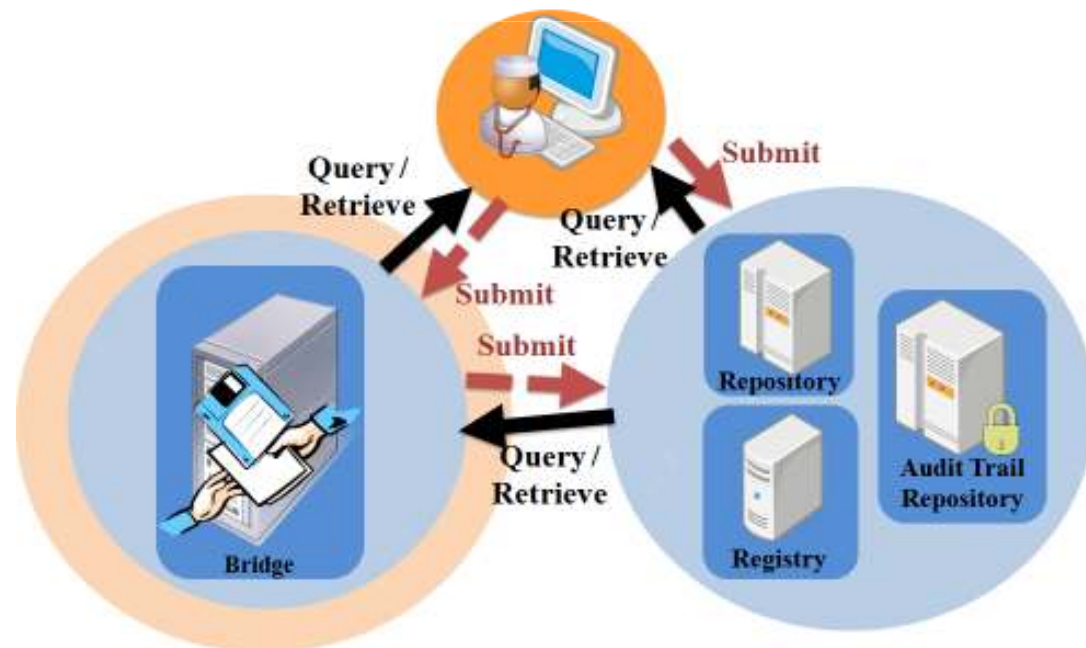
Audit Trail and Node Authentication Security Profile (ATNA)

Establishing a **Security Domain** from a department to enterprise, or Cross-Enterprise Document Sharing(XDS) Affinity Domain with security policy, security procedures, patient information confidentiality, data integrity and user accountability

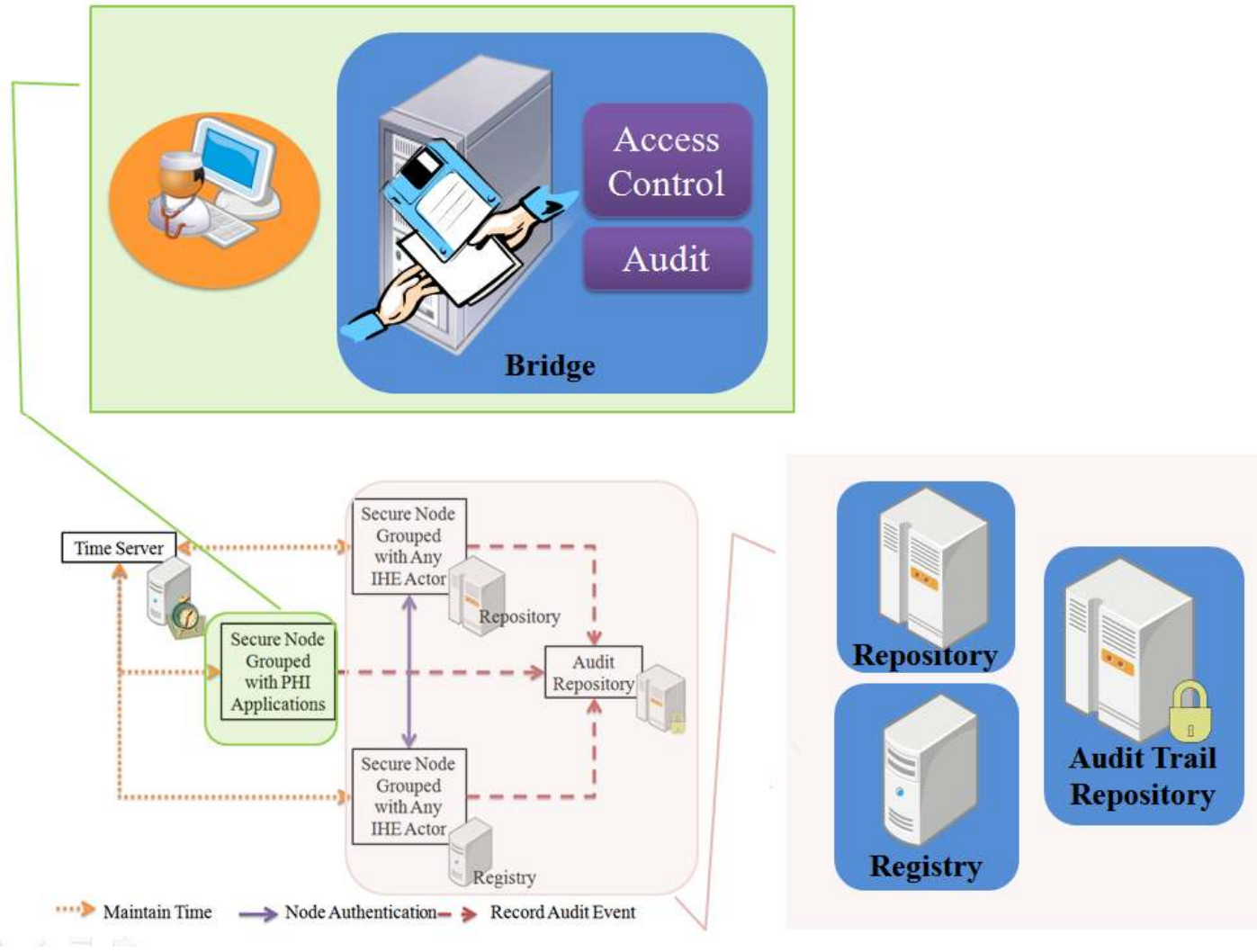


Aims

- Building the basic secure document-based EHR prototype system based on IHE **ATNA**
 - Condition-based access control
 - Audit trails



System Design



Condition-based Access Control

```

HCP: <HCP, +, view, EPR, weak>; <HCP, +, view, PID, weak>; <HCP, +, view, DmD, weak>; <HCP, +, view, Prsc, weak>;
<HCP, -, view, PV, weak>; <HCP, -, execute, PO, weak>.

Physician: <HCP, +, view, PV, weak>

Resident: <Resident, exp-abs(aPatCod) { aPatCod in patCtx.in_patients |
netCtx.peer_dns in secCtx.emergency_domains | netCtx.peer_dns in secCtx.clinic_domains
}, execute, PO, strong>.

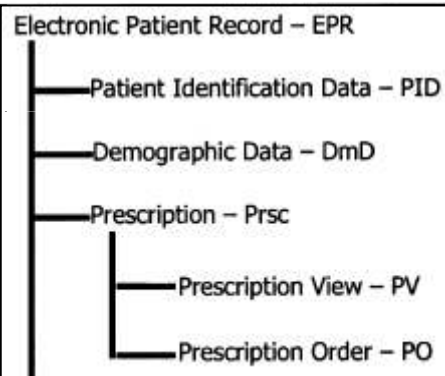
Audit Physician: <Audit Physician, -, execute, PO, strong>; <Audit Physician, exp-abs(aPatCod) { patCtx.health_plan(aPatCod) in userCtx.affiliations
}, view, PV, weak>.

Paramedic: <Paramedic, exp-abs(aPatCod) { aPatCod in patCtx.in_patients &
paramedicCtx.is_in_shift_work(dtCtx.date_time, userCtx.employee_number)
}, view, PV, weak>.

Clinical Researcher: <Clinical Researcher, -, view, PID, weak>; <Clinical Researcher, +, view, PV, weak>.
    
```

(c) Access authorizations

A contextual role-based access control authorization model for electronic patient record. Stud Health Technol Inform. 2006 Sep;124:173-8.



System User : Administrator

Healthcare Provider Register

Name : Wang Shou Ming

ID : A123456789

Add New Roles

Condition	Department	Roles	
General	1a	Physician	Auxiliary Nurse

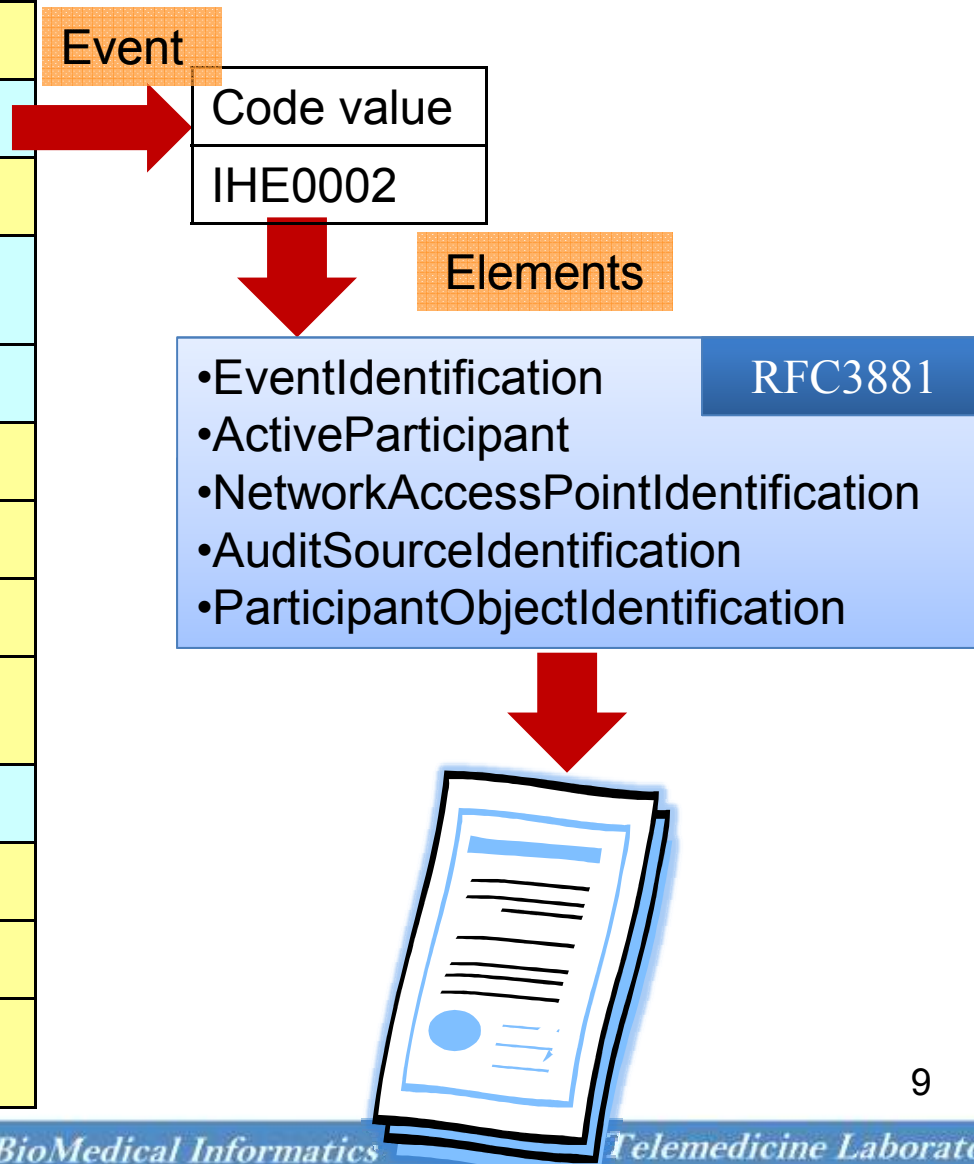
Submit

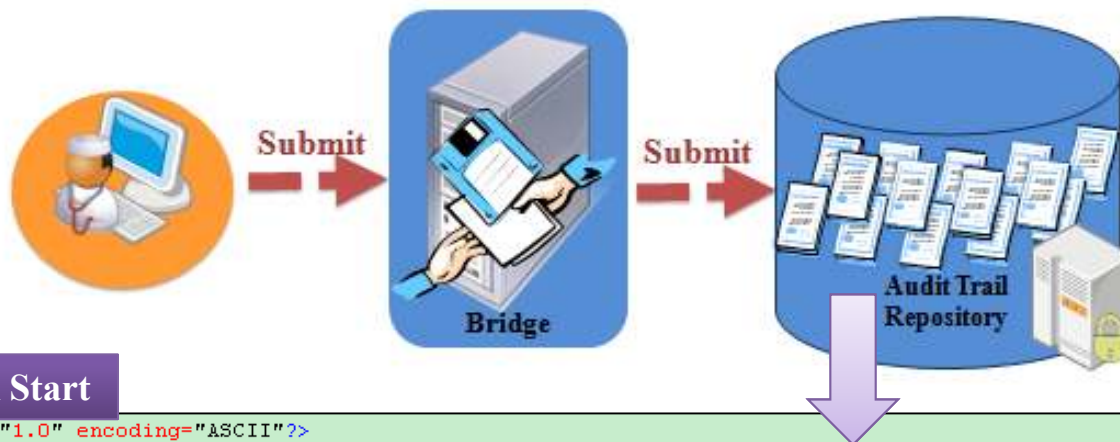
Existing Roles

Condition	Department	Roles	Privilege Operation	Resource
General	3c	Assistant Physician	+	Execute order Prescription

- Conditions
 1. General
 2. Patient
 - Agent
 - Family members
 - Other
 3. Emergency

Trigger Event	Vocabulary
Actor-Start-Stop	Application Activity
Health-service-event	Health Services Provision Event
Order-record-event	Order Record
Medication	Medication Event
Patient-record-event	Patient Record
Patient-care-assignment	Patient Care Resource Assignment
Patient-care-protocol	Patient Care Protocol
PHI-export	Export
Procedure-record-event	Procedure Record
Security Administration	Security Alert
Study-Object-Event	DICOM Instances Accessed
Patient-care-episode	Patient Care Episode
PHI-import	Import
Query Information	Query
Study-used	DICOM Instances Accessed





Application Start

```

1 <?xml version="1.0" encoding="ASCII"?>
2 <AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="healthcare-security-aud
3   <EventIdentification EventActionCode="E" EventDateTime="2009-05-02T01:08:13.390+08:00" EventOutcomeIndicator="0">
4     <EventID code="110100" codeSystemName="DCM" displayName="Application Activity"/>
5     <EventTypeCode code="110120" codeSystemName="DCM" displayName="Application Start"/>
6   </EventIdentification>
7   <ActivePart
8     <RoleIDCo
9   </ActivePar
10  <ActivePart
11    <RoleIDCo
12  </ActivePar
13  <AuditSourc
14 </AuditMessag

```

Provide and Register Document Set

```

1 <?xml version="1.0" encoding="ASCII"?>
2   <AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="heal
3     <EventIdentification EventActionCode="R" EventDateTime="2009-05-02T01:08:20.234+08:00" EventOutcomeIn
4       <EventID code="110106" codeSystemName="DCM" displayName="Export"/>
5       <EventTypeCode code="ITI-15" codeSystemName="IHE Transactions" displayName="Provide and Register Do
6     </EventIdentification>
7     <ActiveParticipant NetworkAccessPointID="10.220.91.101" NetworkAccessPointTypeCode="2" UserID="http://1

```

Application Stop

```

1 <?xml version="1.0" encoding="ASCII"?>
2 <AuditMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="healthcare-security
3   <EventIdentification EventActionCode="E" EventDateTime="2009-05-02T01:08:20.390+08:00" EventOutcomeIndicator="0">
4     <EventID code="110100" codeSystemName="DCM" displayName="Application Activity"/>
5     <EventTypeCode code="110121" codeSystemName="DCM" displayName="Application Stop"/>
6   </EventIdentification>
7   <ActiveParticipant UserID="adapter" UserIsRequestor="false">
8     <RoleIDCode code="110150" codeSystemName="DCM" displayName="Application"/>
9   </ActiveParticipant>
10  <ActiveParticipant UserID="EHR" UserIsRequestor="true">
11    <RoleIDCode code="110151" codeSystemName="DCM" displayName="Application Launcher"/>
12  </ActiveParticipant>
13    <AuditSourceIdentification AuditSourceID="10.220.91.101"/>
14 </AuditMessage>
15

```

Conclusion and Discussion

- IHE ATNA-based EHR prototype system for the document-based electronic health records
- Fulfilling user authentication we require
- Increasing medical record owner's confidence
- Providing a consistent view of audit logs

Limitation

- The design of user interfaces for EHRs and audit logs does not consider.

Acknowledgement

- It is a great appreciation to Information and Communications Research Laboratories, Industrial Technology Research Institute of Taiwan for funding this research project, and the excellent research assistances by Ms. Yi-Ting Chou.

Thank you for your attention!