International Telecommunication Union

Architectures review for interoperability in e-health

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What is …

- an architecture ?

  According to IEEE 1471-2000, ‘The fundamental organization of a **system** embodied in its **components**, their **relationships** to each other, and to the environment, and the **principles** guiding its design and evolution’

- an architectural framework ?

  A toool which can be used for developing a broad set of architectures. It should describe a **method** for designing an information system in terms of a **set of building blocks** and for showing how the building blocks fits together. It should contain a set of **tools** and provide a **common vocabulary**. It should also include **recommended standards** and **compliant products** that can be used to implement the building blocks.

Why do we need an architecture?

- A more efficient IT operation
- Better return on existing investment, reduced risk for future investment
- Faster, simple and cheaper procurement

Explicitly "architected" systems seem to turn out "faster, better and cheaper"

Architecture is recognized as a critical element in the successful development and evolution of systems

Why do we need an architectural description?

Used for the following:

- Expression of the system and its evolution
- Collection of stakeholders concerns
- Communication among the system stakeholders
- Evaluation and comparison of architectures in a consistent manner
- Planning, managing and executing the activities of system development
- Verification of a system implementation's compliance with an architectural description

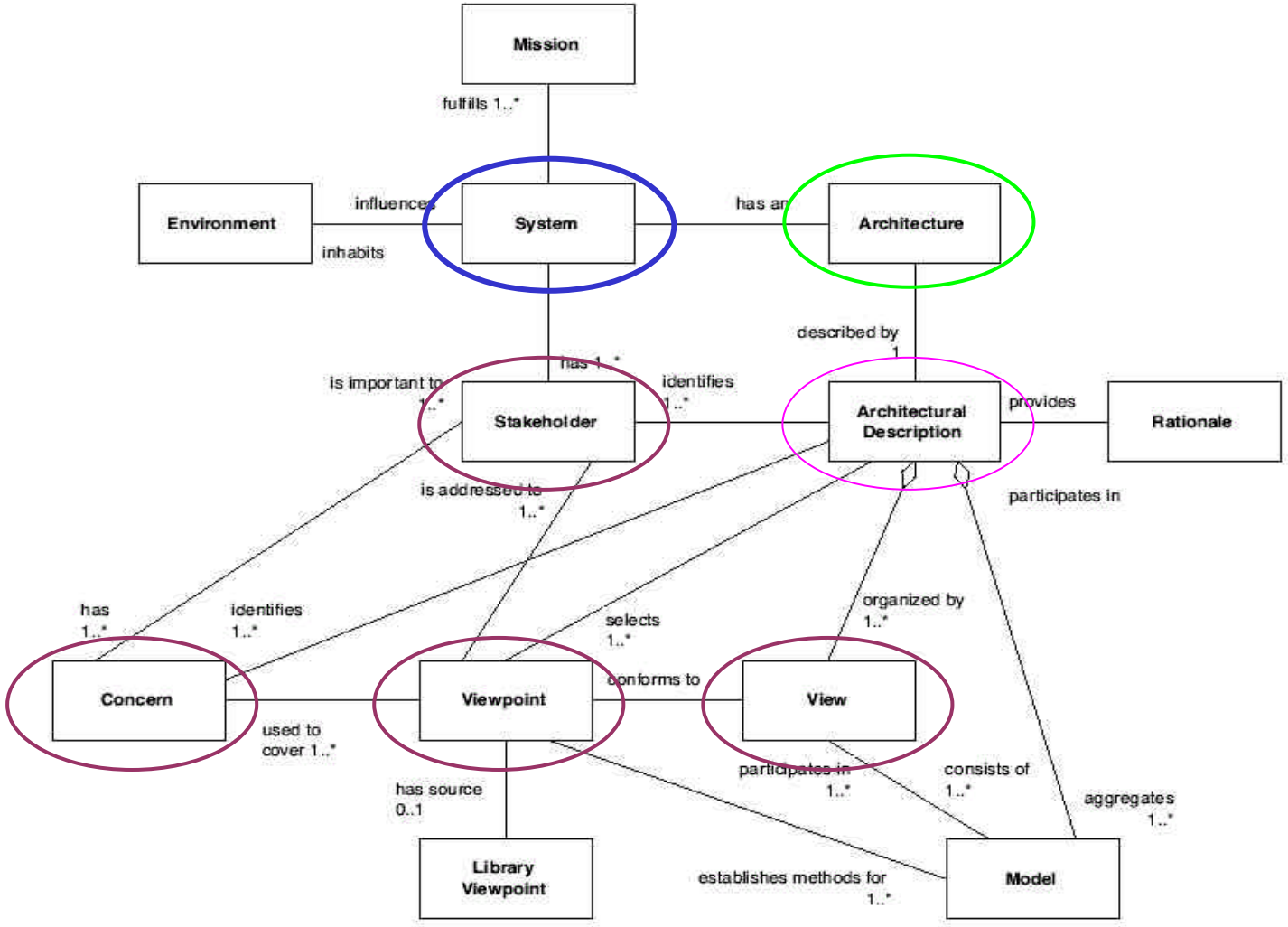
Basis for standarisation and interoperability

IEEE 1471-2000

- … is a **recommended practice** for architectural description (AD) of software intensive systems
- … does not specify format or media for AD

ITU-T

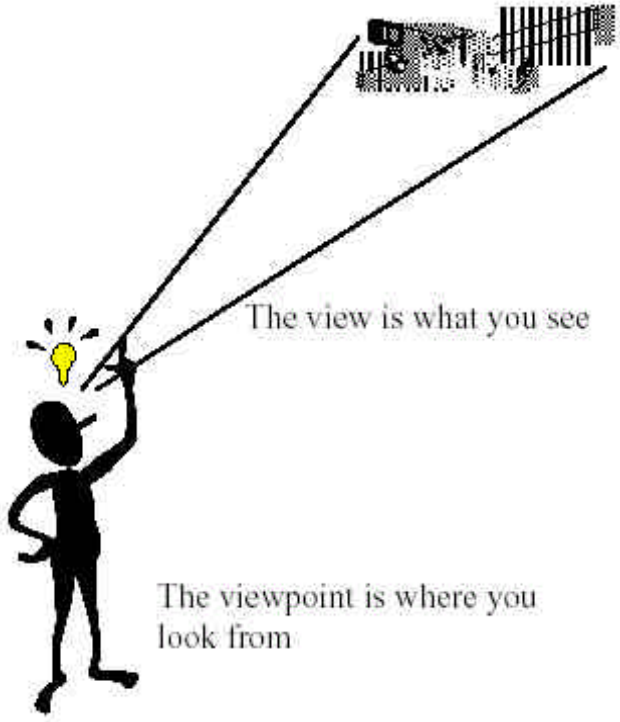
IEEE 1471-2000



IEEE 1471-2000

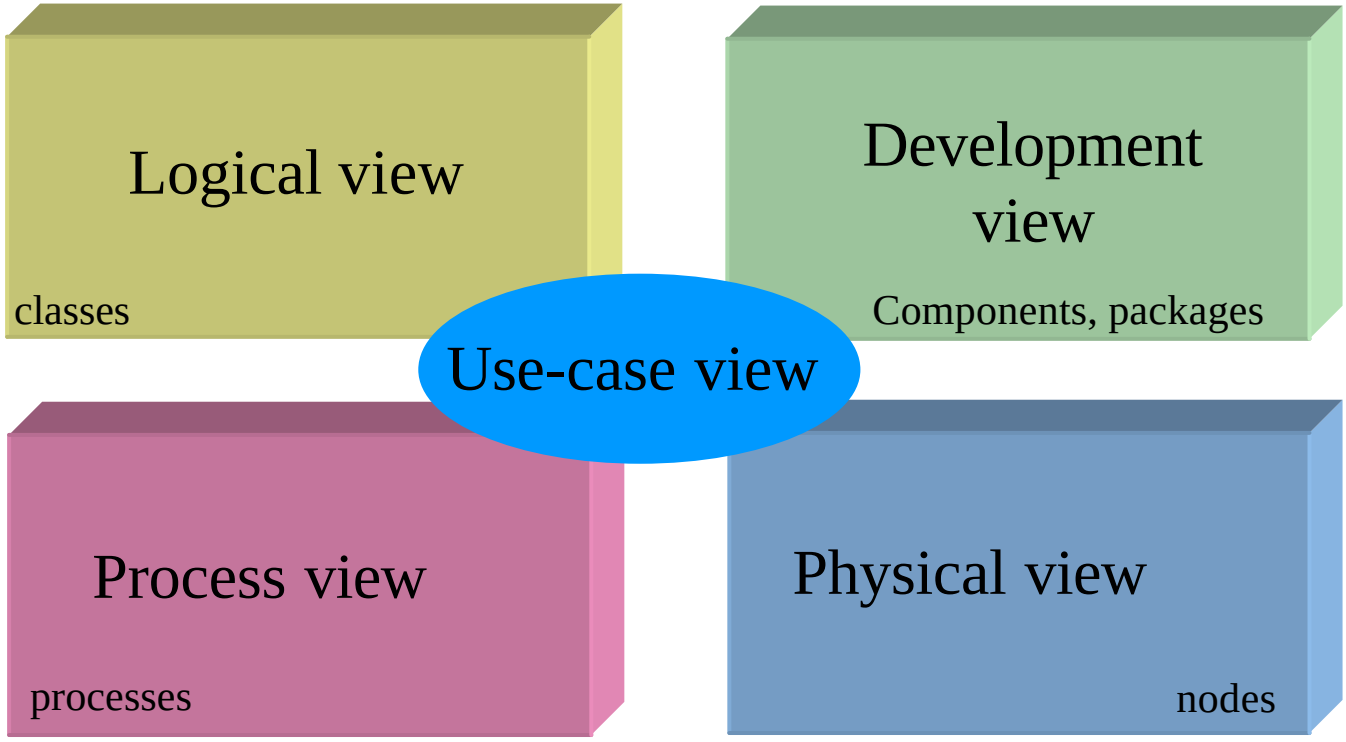
Views & viewpoints

- A view is a description of the entire system from the perpective of a related set of concerns
- A viewpoint is a standard or template for constructing a view



The “4+1” views model

Kruchten, Rational



A practical set of viewpoints

TOGAF

- TOGAF is an architectural framework created by the Open Group, enabling the design, building and evaluation of the proper architecture for each case
- Three main parts:
  - TOGAF Architecture Development Method (ADM)
  - TOGAF Enterprise Continuum
    - TOGAF Foundation Architecture
      - Technical Reference Model
      - **Standards Information Base**
    - ...
  - TOGAF Resource Base

TOGAF

- IEEE 1471-2000 compatible
- Architectures˜views
  - Business architecture
  - Applications architecture
  - Data architecture
  - Technology architecture
- Not all the architectures are needed in each case

TOGAF

Business Architecture Views	Data Architecture Views	Applications Architecture Views	Technology Architecture Views
Business Function View	Data Entity View	Software Engineering View	Networked Computing/ Hardware View
Business Services View			
Business Process View			
Business information View			
Business Locations View			Communications Engineering View
Business Logistics View			
People View (organization chart)	Data Flow View (Organization Data Use)	Applications Interoperability View	Processing View
Workflow View			
Usability View			
Business Strategy and Goals View			Cost View
Business Objectives View	Logical Data View	Software Distribution View	
Business Rules View			Standards View
Business Events View			
Business Performance View			
	System Engineering View		
Enterprise Security View			
Enterprise Manageability View			
Enterprise Quality of Service View			
Enterprise Mobility View			

Example taxonomy of architecture views

Telemedicine System Interoperability Architecture

- New concept paper – vehicle for debate in the telemedicine community regarding the development of industry-accepted interoperability specifications

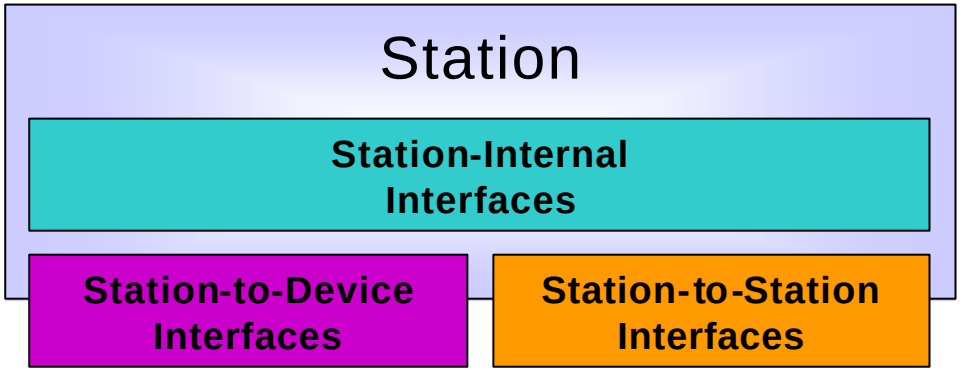
- Funded by U.S. Army Telemedicine and Advanced Technologies Research Center and executed by Sandia National Laboratories

Telemedicine System Interoperability Architecture

- Two interoperability levels
  - How nodes or stations within a telemedicine system can be composed and how the resources within a station federate to deliver its functionality
  - How different station in a system discover each other's existence and then begin transacting business

Telemedicine System Interoperability Architecture

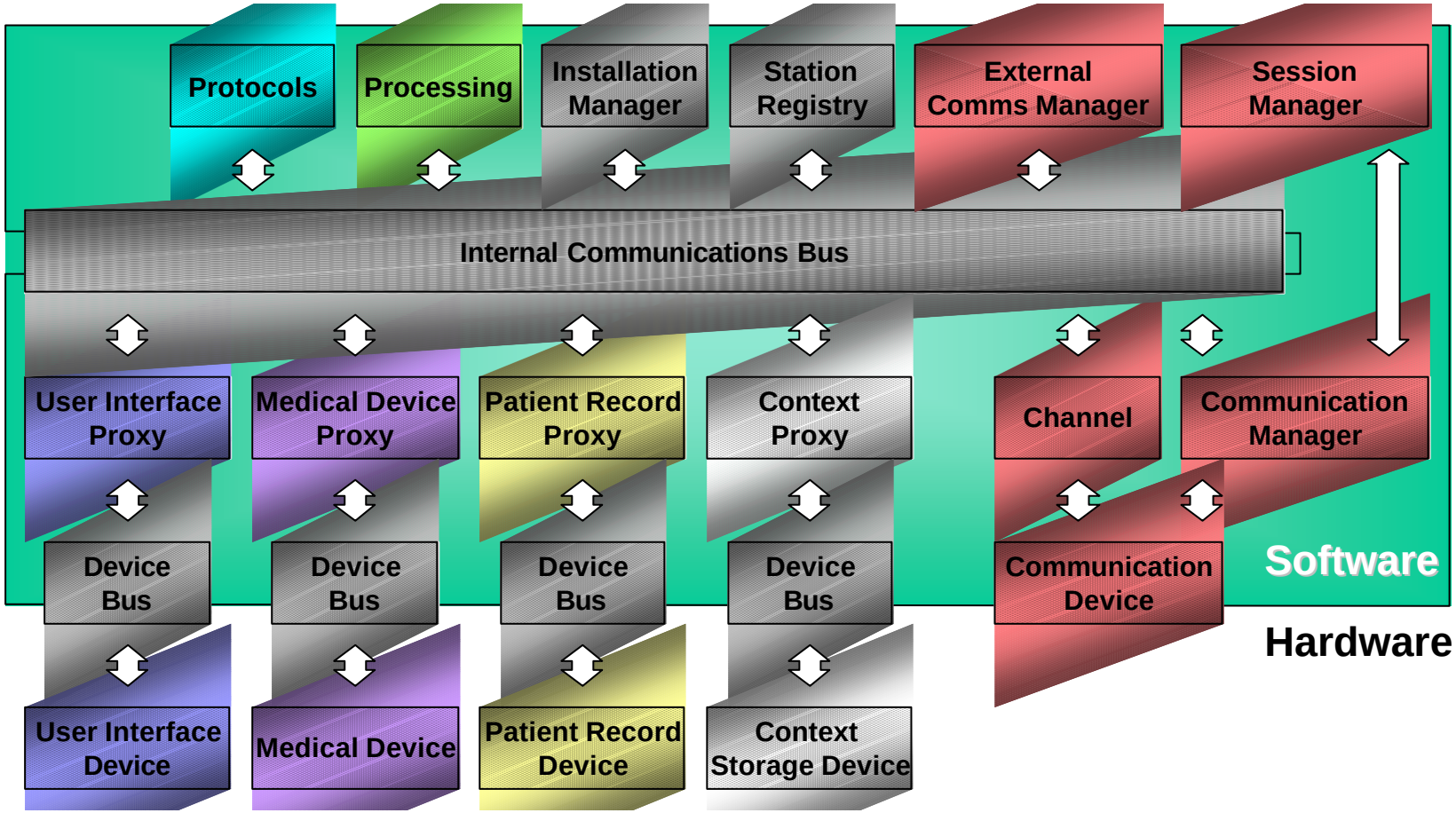
- Station-level architecture



→ Three sets of interfaces

Note: Station-internal interfaces are defined explicitely to allow the creation of telemedicine stations from independently developed components, including those not originally designed for use in telemedicine applications

Telemedicine System Interoperability Architecture



Logical Station Architecture

Telemedicine System Interoperability Architecture

- Candidate Technologies and Standards
  - Distribution of Station Components
  - Internal communication bus
  - Device buses
  - User Interfaces
  - Patient record communications
  - Videoconference
  - ...
- Making Interoperability a Reality
  - Scheduled plan with nine phases

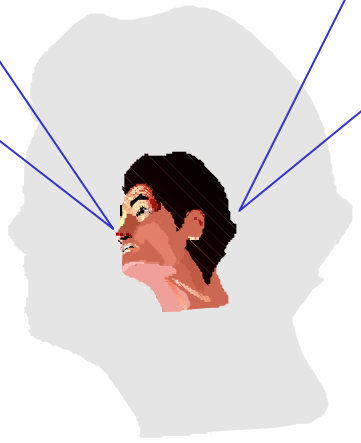
Other architectures

- Healthcare Information System Architecture - HISA ENV 12967
- HL7 – Clinical Document Architecture CDA
- Sun's Platform Independent Framework for e-health
- SAMTA - Open Scaleable Architecture for Multimedia Telemedicine Applications

Standards needed in e-health and telemedicine

What standards do we need?

They already exist?



Need of a common framework˜ architecture

Standards needed in e-health and telemedicine

- Distribution of components (CORBA, .NET…)
- Internal Communication Bus (IP, Firewire …)
- Device Buses (IrDA, USB, Bluetooth …)
- External Communications Media (ISDN, xDSL …)
- User Interfaces
- Medical devices (IEEE 1073, POCT, DICOM …)
- Patient Record Repository (ENV 13606, GEHR …)

Standards needed in e-health and telemedicine

- Patient Record Communications (HL7, OMG ...)
- Imagery Communications (DICOM, CIAS ...)
- Videoconferencing (SIP, H.323 ...)
- Security
- Terminology

Need of a common framework˜ architecture

Bibliograhy and interesting links

- TOGAF v8, The Open Group, 2002
- IEEE 1471-2000, IEEE, 2000
- The IEEE 1471-2000 Standard Architecture view and Viewpoints, IEEE AWG INCOSE 2001 Tutorial
- Telemedicine System Interoperability Architecture v0.9, SANDIA, 2003

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