

**II Regional Seminar on e-Health and Telemedicine in Latin
America and the Caribbean:
Innovation practices and standards
Caracas, 26 and 27 July 2011**

**State of the art of international
standards in Telemedicine and
e-Health**

Paolo Rosa
ITU Regional Director for the Americas a.i.
Brasilia

September 2000

Millennium Development Goals Indicators

The official United Nations site for the MDG Indicators



Millennium Declaration, **189 countries**, **147 heads of State** and Gov

Goal 1. Eradicate extreme poverty and hunger

Goal 2. Achieve universal primary education

Goal 3. Promote gender equality and empower women

Goal 4. Reduce child mortality

Goal 5. Improve maternal health

Goal 6. Combat HIV/AIDS, malaria and other diseases

Goal 7. Ensure environmental sustainability

Goal 8. Develop a global partnership for development

(Target 8.F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications)



Part I: A general overview of ITU

Part II: ITU, ICTs & E-health

Part III: Standards and e-Health

Part IV: Conformance and Interoperability



E-Health

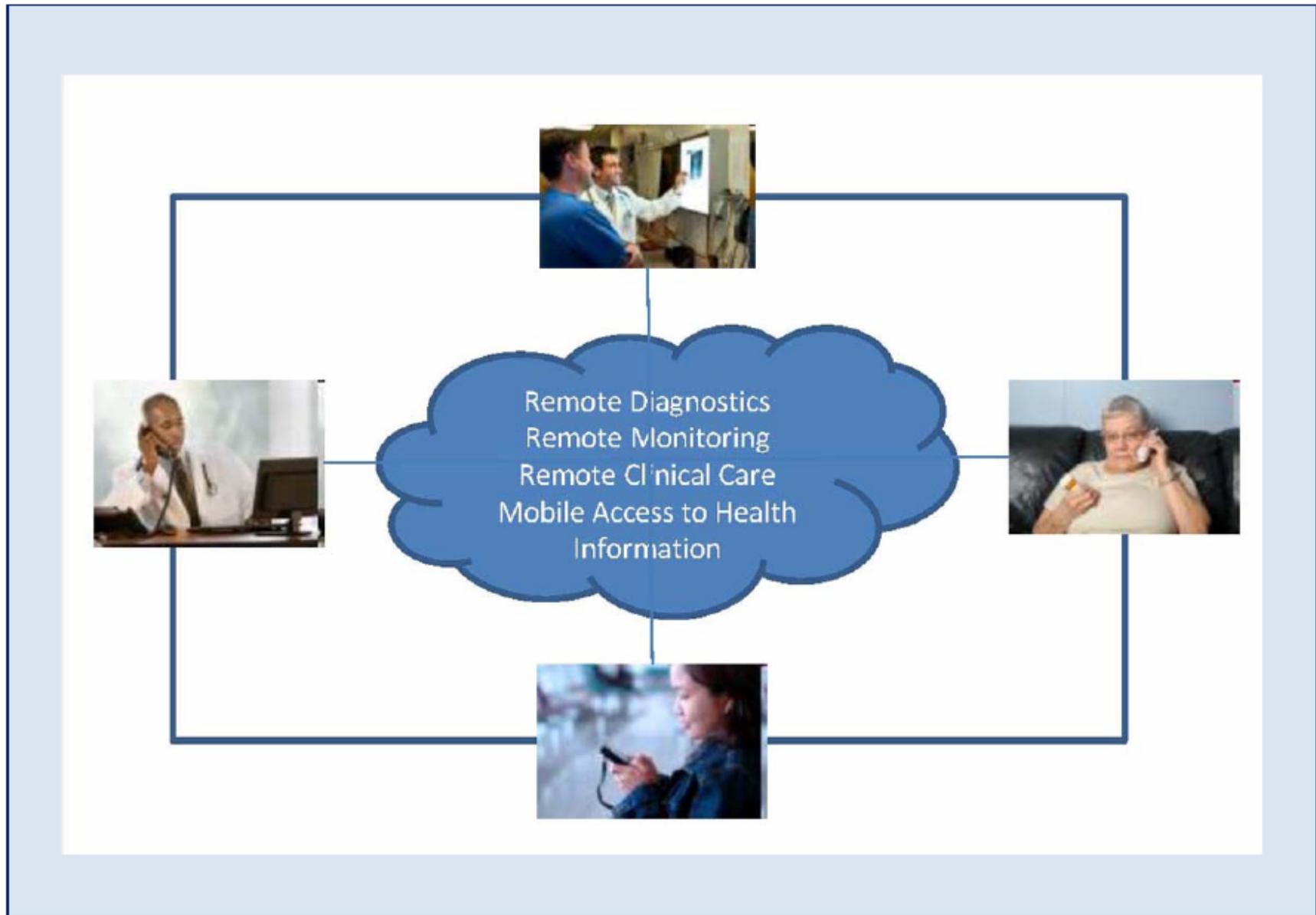
World Health Organization (WHO/OMS) definition

cost-effective and ***secure use of information and communications technologies*** in support of health and health-related fields including:

- ***health-care services,***
 - ***health surveillance,***
 - ***health literature, and***
 - ***health education, knowledge and research...***"
- (Resolution 58/28 of the World Health Assembly, Geneva, 2005).



Remote healthcare & diagnostics



Trends in e-Health

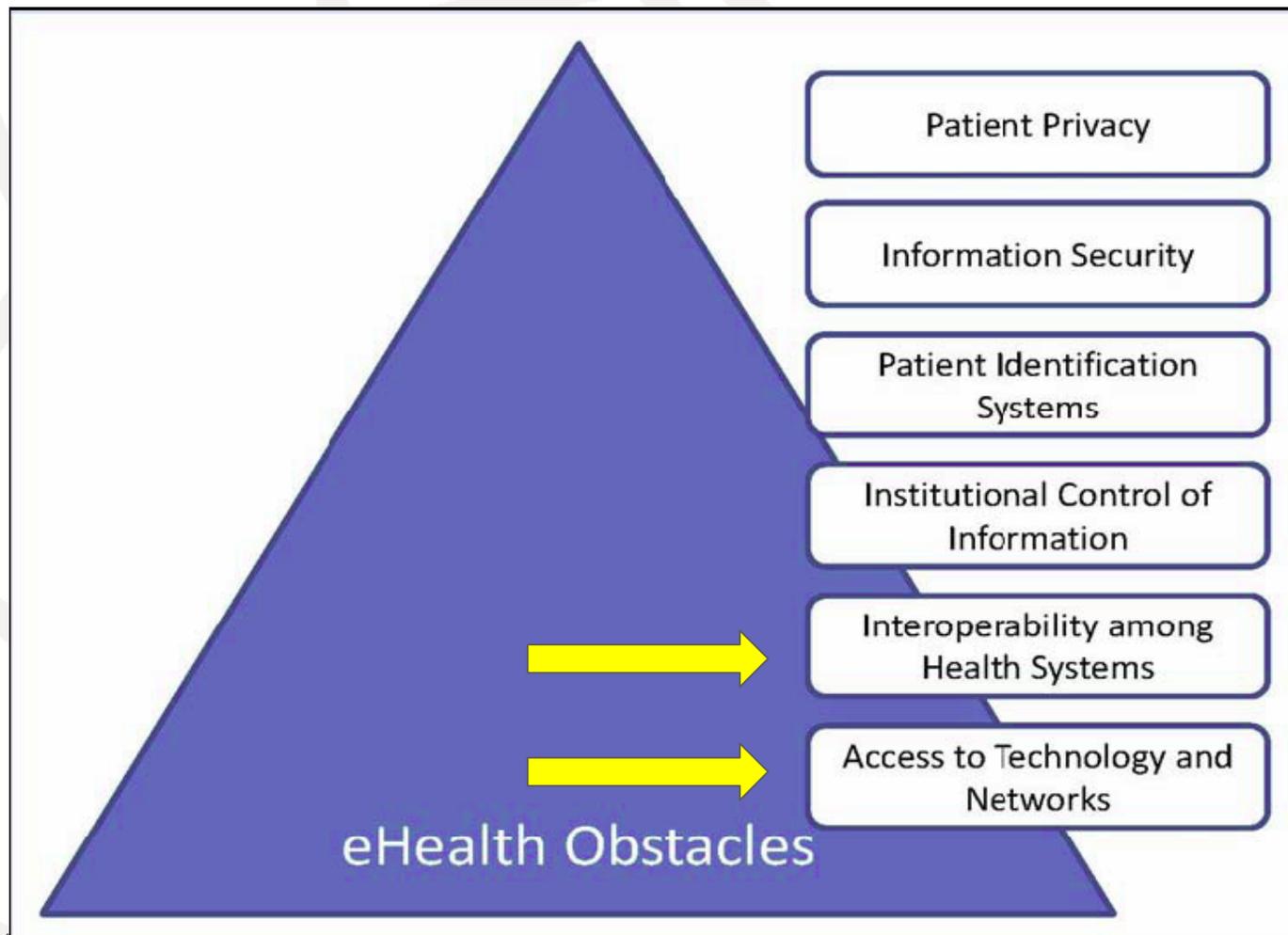
Four emerging trends in e-Health systems that use ICTs for the **delivery of healthcare services** and for the digital **recording, storage, and sharing** of medical information:

- **Genomic Medicine**
- **Standardized Electronic Health Records**
- **Remote Healthcare and Diagnostics**
- **Aggregated Public Health Data.**



Challenges & Obstacles in e-Health

- ❖ Availability of ICTs and telecommunications services to **access** electronic health records.
- ❖ **Interoperability** to exchange both computer interpretable data and human interpretable information and knowledge.



E-health critical factors and issues

critical factors

- proper project **management tools**,
- building up and maintenance of adequate **technological infrastructure**,
- commitment of trained end users and **ICT-literate citizens**
- the **political strategies** to achieve challenging but realistic e-health goals.

key issues

- **data security and privacy**
- **affordable e-health costs**: share communication infrastructures with other ICT applications requiring secure and interoperable systems, such as e-government and e-commerce



Keywords

Standards

Interoperability

*Privacy, Security
& Regulatory
issues*

Infrastructures

*Contents
Harmonization*

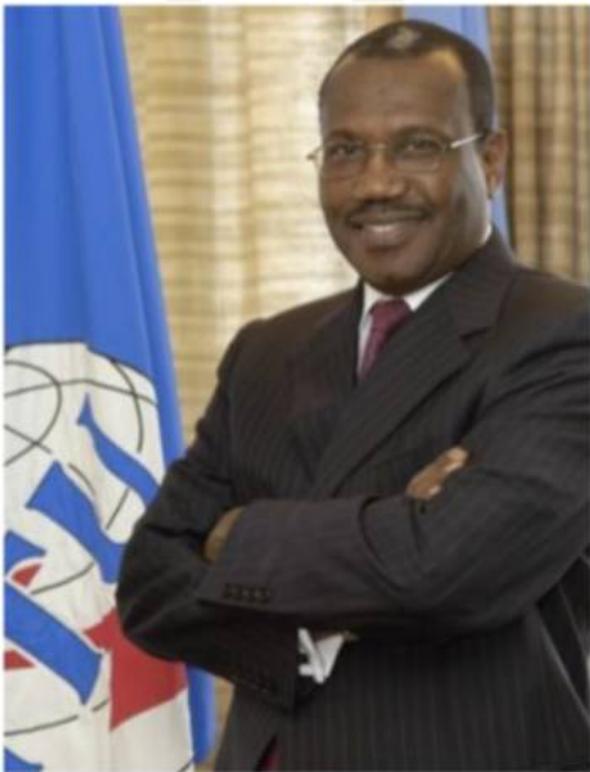
*Awareness &
Participation*

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Dr. Hamadoun Touré
ITU Secretary General



Introduction to ITU

- ***Founded in 1865***, it is the oldest specialized agency of the UN system
- ***Standards*** making is the first ITU activities
- 192 ***Member States***, 780 ***private sector*** entities
- HQ Geneva, 11 regional offices, 760 staff/80 nationalities
- ***Five elected officials:***
 - Secretary-General
 - Deputy Secretary-General
 - Director of the Radiocommunication Bureau (BR)
 - Director of the Telecommunication Standardization Bureau (TSB)
 - Director of the Telecommunication Development Bureau (BDT)



Hot Topics in ITU

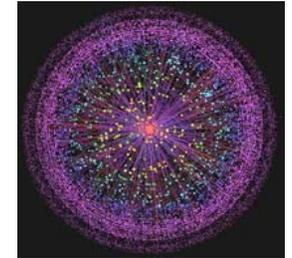


Connect the World

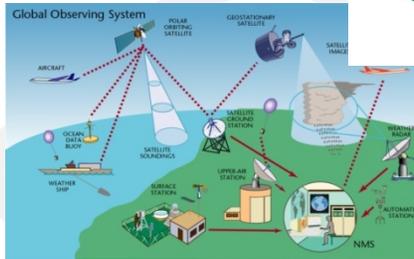


Smart Grids

Future Networks



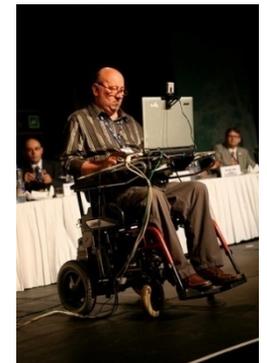
Climate Change



Optical Technology



Accessibility



H.264



Academia Kaleidoscope



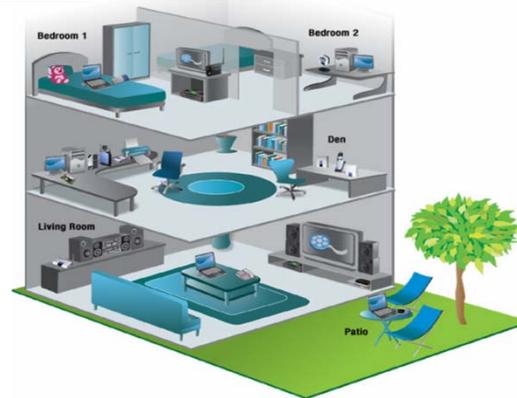
Connection: a human right



Time needed to download online content at different connection speeds

Content \ Connection speed	256kbps	2Mbps	10Mbps	100Mbps
Google home page (160 KB)	00:00:05	00:00:01*	00:00:00*	00:00:00*
Music track (5MB)	00:02:36	00:00:20	00:00:04	00:00:00*
Video clip (20MB)	00:10:25	00:01:20	00:00:16	00:00:02*
CD / low quality movie (700MB)	06:04:35	00:46:40	00:09:20	00:00:56
DVD / high quality movie (4GB)	34:43:20	04:26:40	00:53:20	00:05:20

Source: ITU calculation.
Note: * Rounded values.



ITU: Five Regional Initiatives for Americas 2011-2014

WTDC-10 (Res. 17 - Annex 2)

- Emergency Communications
- Digital Broadcasting
- Broadband access and uptake in urban and rural areas
- Reduction of internet costs
- Human capacity building on ICTs with emphasis on persons with disabilities and people living in rural and deprived areas



Connect Americas: Topics

Panama, July 2012 (tbc)

Broadband as the main solution to reduce Digital Divide: AMS Regional Initiatives 2, 3 and 5:

- ❖ Digital Broadcasting
- ❖ Broadband access to urban and rural areas
- ❖ Human Capacity Building on ICTs, with emphasis on persons with disabilities and people living in rural and deprived urban areas

Emergency Telecommunications: AMS Regional Initiative 1

- ❖ Emergency Communications to assist ITU Member States in case of disasters in collaboration with OCHA and other UN agencies.
- ❖ Risk reduction, preparedness, early warning, prevention, response and mitigation

ICTs and Climate Change:

- ❖ ICTs role as an enabling technology to reduce GHG emissions in other sectors.

Internet and Cyberthreats: AMS Regional Initiative 4,

- ❖ Ways and means to reduce Internet access and interconnection costs.
- ❖ Global Cybersecurity Agenda / IMPACT
- ❖ Child on-line Protection



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Telemedicine: History & Concept

- **Early 1900s** : Old concept as using **telephones and the telegraph** to provide medical advice at a distance in the early 1900
- **1994**: A century later, ITU requested for access to healthcare services for **rural communities** ([WTDC, 1994](#))
- **1995**: **ITU and the World Health Organization (WHO)** established cooperation mechanisms to facilitate the provision of health and medical services supported by ICTs.
- **2000**: Concepts of "telemedicine" and "telehealth" broadened and integrated into **"e-Health" definition** as the means of providing healthcare services at a distance.



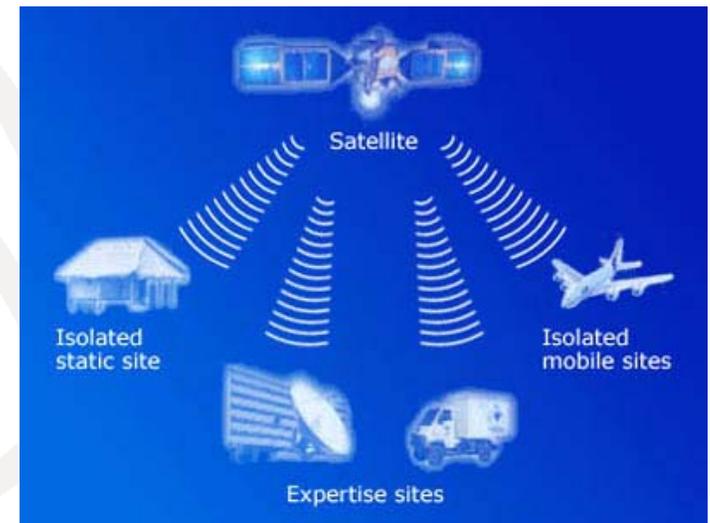
Telemedicine Alliance (TMA)

European Commission – ITU – WHO – ESA (2002)
a Citizen-centered healthcare network

2002: ESA, WHO, ITU and European Commission Cooperation (Information Society Technologies programme) telemedicine application and benefits for to Europeans

2005: Strategy paper (TMA Bridge) **lower the interoperability barriers** to European e-Health systems from a political, socio-organizational and technical perspective

Technologies: Satellites, televisions, radios, mobile phone and computers to improve health services and to make the best use of valuable medical services



WSIS: World Summit Information Society

Action Line 7: e-health

- ❖ E-health ***solutions in developing countries***, where the acute ***shortage of personnel*** : doctors, nurses and paramedics is directly proportional to the enormous ***unsatisfied demand*** for health services,
- ❖ ***ICTs facilities*** needed to accomplish the objectives of the health-care system.
- ❖ E-health requires appropriate ***regulatory, legal and policy frameworks*** in both the telecommunication and health sectors.
- ❖ ***ITU standards***: Multimedia Framework for e-Health
- ❖ ***Key challenges and barriers*** and possible solutions

Connect the World: ITU Flagship mMobile mHealth Initiative

Mission: Assist developing countries to ensure the best use of ICT/existing telecommunications infrastructure for mobile health services

Objectives:

- **Provide DCs with** mMobile mHealth **tailored services** and facilitate the **access** to required **funds and other resources**
- Create **Capacity building** opportunities
- Facilitate the **local dialogue** between stakeholders for new and innovative **business models and public private partnerships**

Partners: ICT **industry**, mobile and fixed network **operators**, **software** developing companies, health **care and medical** device industries , Research centers, and NGOs

itu.int/ITU-D/connect/flagship_initiatives/mHealth.html



Mobile e-Health Solutions for Developing Countries

(ITU-D Report 2010)

- ❖ Role of **mobile telecommunication** technology for **remote** medical consultation and administration of patient treatment
- ❖ **The goal: practical information** on ongoing Mobile Health (mHealth) solutions:
 - ✓ Mobile Health **concept**
 - ✓ use Clinical Decision Support Software and Traffic Control System for **Medical Information Network**,
 - ✓ Models of Wireless **Access and Connectivity**, etc.;
 - ✓ **Case studies** from different countries.

Estrategia regional y plan de acción sobre eSalud

Pan American Health Organization/World Health
Organization (PAHO/OMS)



principios y valores estipulados en la ***Agenda de Salud para las Américas*** (2008-2017) :
derechos humanos, universalidad, accesibilidad e inclusividad, solidaridad panamericana, equidad en salud, participación social

PAHO/OMS

Estrategia regional

- ❖ mejorar el **acceso** a los servicios de salud y su calidad, utilizando las **TIC**
- ❖ formación de trabajadores de salud con programas de **alfabetización digital**
- ❖ Disminuir factores que limitan una atención médica oportuna y de calidad:
 - ✓ escasez de recursos humanos,
 - ✓ **infraestructura, equipamiento** y medicamentos,
 - ✓ la **distancia física y cultural** entre la oferta pública y la población que solicita los servicios,



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eHealth standardization: a complicated and challenging standardization area

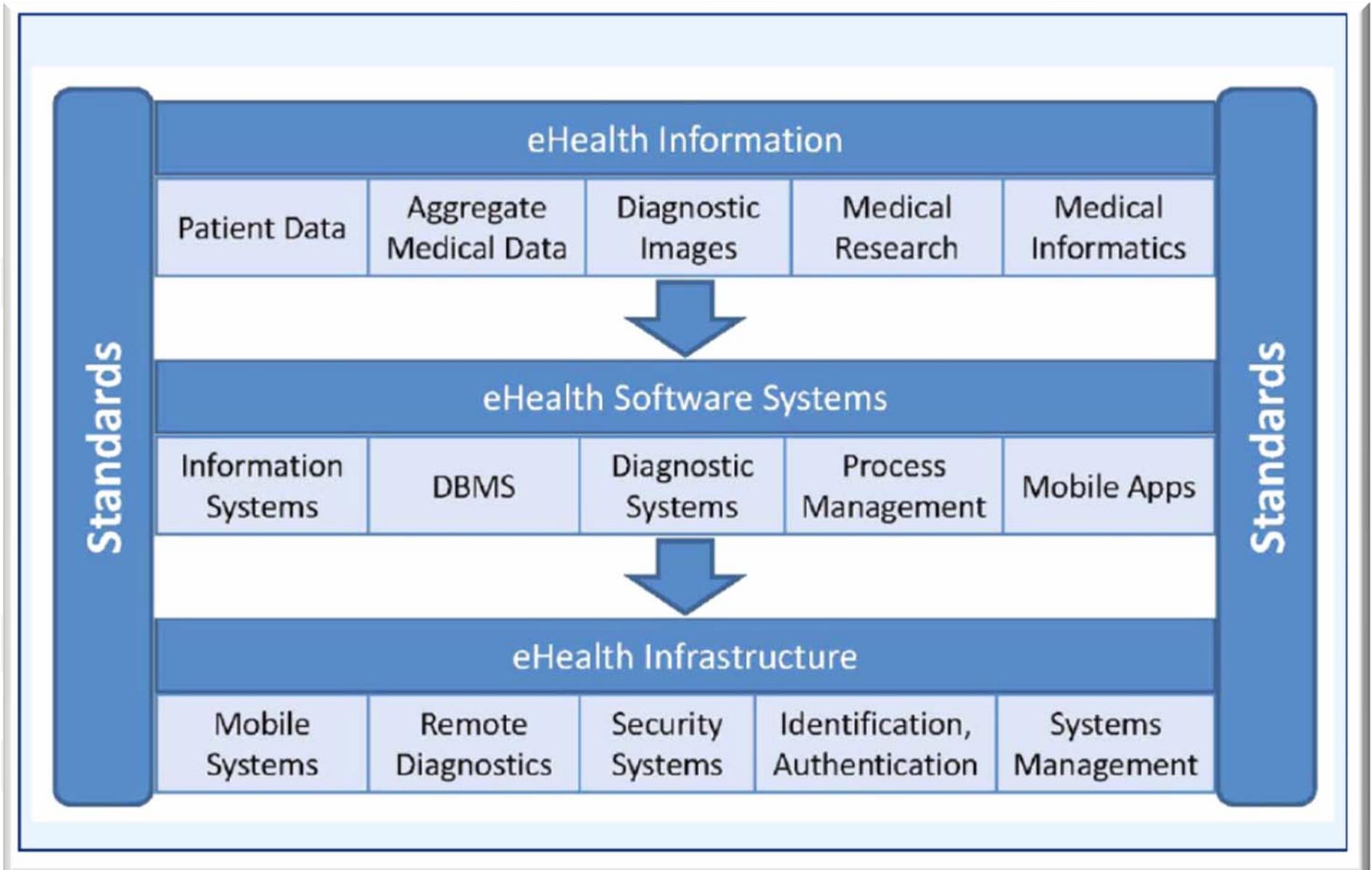
Different information systems, medical devices, *proprietary* specifications, sensitive nature of information, high degree of *privacy* protections, quality assurance, and *security*, heavy national *regulations*, health practitioners adverse and *reluctant* to adopt new technologies.

A multi-actors environment:

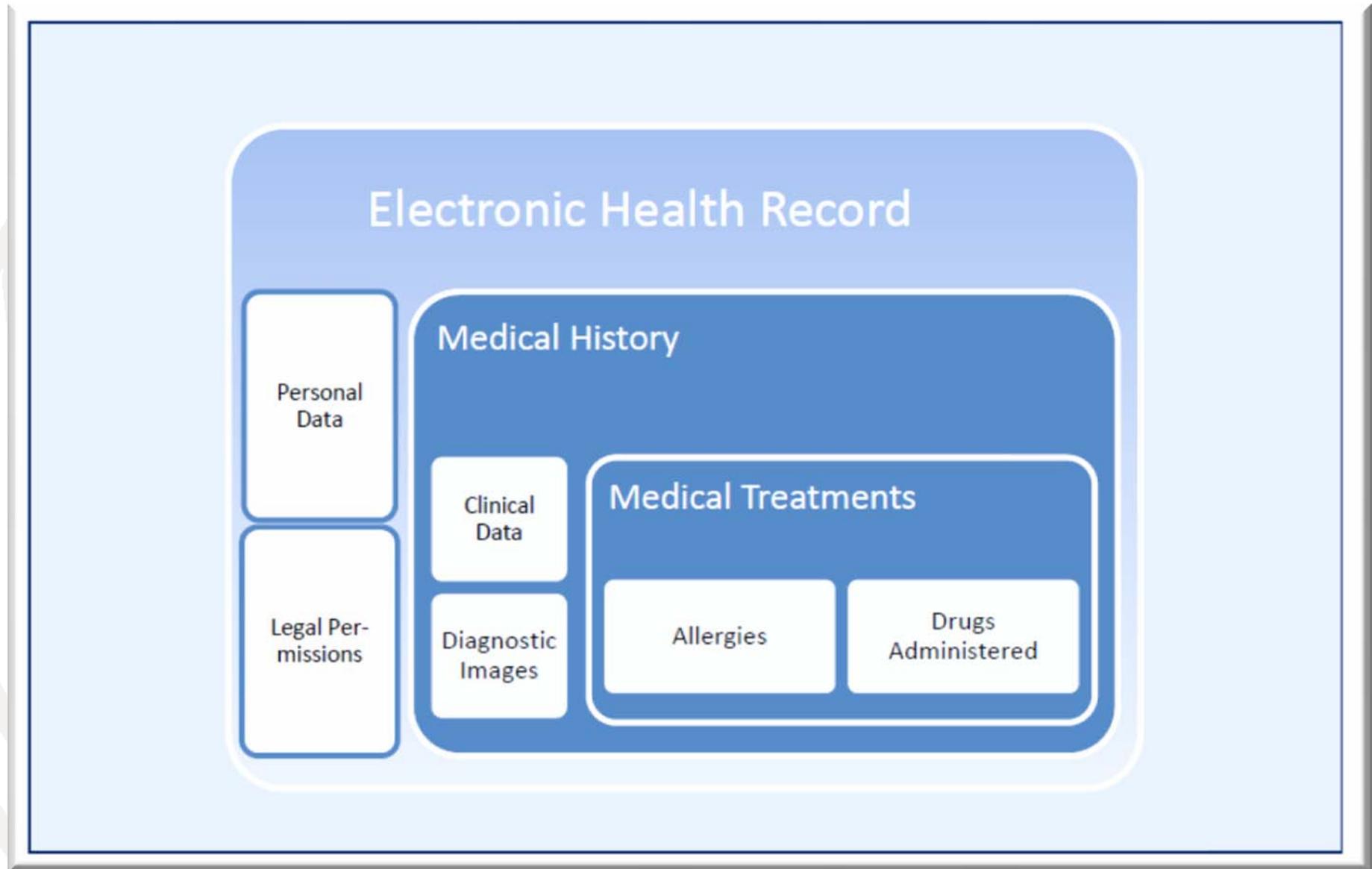
- ❖ hospitals,
- ❖ pharmacies,
- ❖ primary care physicians,
- ❖ patients in their homes
- ❖ administrative entities
- ❖ insurance companies
- ❖ government agencies



Standards environment



The Electronic Health Record



Quality & Suitable standards

Technical Interoperability:

- exchanging information institutional systems,
- high degree of **compatibility** among medical devices and digital systems, regardless of **manufacturer**.

Economic Efficiency:

- **invest** in costly eHealth solutions with **longevity** systems
- reduce **quickly deprecated solutions** due to new and more eHealth standards options.

Public Accountability impact on individual privacy

- **global public accountability** or
- at least openly available to the **public for oversight**.



Role of standards

- ❖ ***Harmonization of health records*** avoid technically fragmented electronic health records that impede meaningful public aggregation
- ❖ ***spans all areas***
 - ✓ standardized codes for specific procedures
 - ✓ imaging
 - ✓ data formatting standards,
 - ✓ compression standards, and
 - ✓ network level standards

Benefits of Standards

- ❖ **interoperability** to facilitate information exchange and to prevent single **vendor lock-in**
- ❖ minimize the risks of **new technology** development;
- ❖ **reduce costs** by
 - enabling market competition and
 - eliminating expensive and customized solutions;
- ❖ Ensure **widespread adoption**; and
- ❖ address specific concerns about **privacy, security,** and patient identification.



Security and Privacy: Aggregate public health data

Standardized digital health records, patients identification removed, may be used for research, public health assessments, accreditation, patient education, or some commercial purpose, production, insurances,...

Pros: A *large digital repository* documenting patient responses to medical treatments and drug therapies helps medical researchers to evaluate the effectiveness or lack of *effectiveness of treatments* in a more comprehensive and longer term manner than more bounded clinical trials.

Cons: individual *privacy* and information ownership put some *ethical and legal concerns* some of which could be addressed in standards as well as in legal structures.



ITU Report: Standards and e-Health

Dr. Laura DeNardis of Yale University (Jan 2011)



- ❖ envisions **future** of eHealth
- ❖ current eHealth **standardization** landscape and emerging opportunities
- ❖ **obstacles** to overcome
- ❖ activities within the ITU

ITU-T Technology watch reports:
<http://www.itu.int/en/ITU-T/techwatch/Pages/default.aspx>

ITU e-health just search

- ❖ ITU-T Study Group 16: e-health and standardization
- ❖ ITU-T Study Group 16, Question 28: Multimedia framework for e-health applications (H.323, H.264, V.18)
- ❖ ITU-T Study Group 17 Security Question 9: Telebiometrics
- ❖ ITU-T Technical Paper: Roadmap for Telemedicine compiling and analyzing standardization requirements
- ❖ ITU-T SG 12: Quality of Service
- ❖ ITU-T SG 13: NGN & mobile networks
- ❖ ITU-D: ICT Applications for e-health
- ❖ ITU-D Study Group 2: Report Mobile eHealth solutions for Developing Countries
- ❖ ITU: Harnessing the power of ICTs in global health care

ITU-T SG 16 Question 18

<http://www.itu.int/en/ITU-T/techwatch/Pages/ehealth-standards.aspx>

Standardization of Multimedia Systems to support e-health applications.

- ❖ **Inventory** of existing e-health / Telemedicine standards (WHO)
- ❖ eHealth Standardization Coordination Group (**eHSCG**)
- ❖ **Multimedia** framework for e-health applications
- ❖ **Roadmap** for e-health (including Telemedicine) standards
- ❖ Generic **architecture** for e-health applications (and Telemedicine, in particular)
- ❖ Specific **system characteristics for e-health applications** (e.g. video and still picture coding, audio coding, security, directory architecture)



ITU-T SG 17 Question 9

- ❖ **security** requirements and guidelines for any application of telebiometrics.
- ❖ requirements for evaluating **security**, conformance and **interoperability** with **privacy** protection techniques for any application of telebiometrics.
- ❖ requirements for telebiometric applications in a high functionality network (**NGN**).
- ❖ requirements for appropriate generic **protocols** providing safety, security, privacy protection.

WHO Standards Compilation



- Most important standards in all technical and non-technical areas of e-health. Associated fields:
- **Url:** *where the standard is* available, for free if possible.
- **Category:** field shows the *medical environment* in which the standard is used.
- **Others:** other interesting and *latest information*.
- **Relevance:** in a range from 0 to 100, the relevance is a subjective parameter which designates the *importance of the standard in relation to e-Health*.

<http://www.who.int/ehscg/about/en/>



Example compilation

Name Digital Imaging and Communications in Medicine
Brief name DICOM Organization NEMA

Url <http://medical.nema.org/dicom/2003.html>

Descriptions DICOM (Digital Imaging and Communications in Medicine) defines the coding of medical images, the protocols of interchange between both sides and a security policy to hide information from third people.

Used_in Computer tomography, image archives, telediagnostic, EEG, ECG

Category Imaging

Others DICOM 3.0 has added waveform support to allow EEG and ECG interchanges.

Website of Reference : <http://www.dclunie.com>



eHealth Standardization Coordination Group (eHSCG)

Partners:

ITU, WHO, ISO/TC 215, CEN/TC 251, IEEE/1073,, DICOM, HL7 and, recently, OASIS

Overall objective:

Promote **stronger coordination** amongst the key players in all technical areas of e-health standardization.

Exchange of information and cooperate to:

- Identify areas where **further standardization** is required and try to identify responsibilities for such activities;
- Provide **guidance for implementations** and case studies;
- Consider the requirements for appropriate development paths for health profiles of existing standards from **different sources** in order to **provide functional sets for key health applications**;
- Support activities to increase user **awareness** of the existing standards, and case studies.



E-health SDOs-1

ISO/IEEE 11073: ISO/IEEE 11073 Medical/Health Device Communication Standards

- ❖ set of joint *ISO, IEEE, and CEN standards for medical device interoperability*
- ❖ define *messaging structures* but not the transport layer
- ❖ **medical devices** including primarily personnel, or end user or patients use in their own homes or other end points to monitor existing medical conditions
- ❖ *health devices* such as blood glucose monitors, blood pressure monitors, thermometers, pulse oximeters, etc., that.

E-health SDOs-2

ISO/TC 215: ISO's Technical Committee 215 also addresses health informatics. ISO/TC 215 focuses primarily on **electronic health records**. Various **Working Groups** (WGs) within TC 215 address topics such as **data structure**, **messaging and communication**, security, pharmacy and medication, devices, and business requirements for electronic health records.

CEN/TC 251: Comité Européen de Normalisation or European Committee for Standardization - Health Informatics Technical Committee (TC 251)

- ❖ **31 national members** developing pan-European standards.
- ❖ Coordination of the development of standards for eHealth focused on technologies at the **content** level rather than dealing with communication technologies. And **interoperability of data** among devices and info systems

E-health SDOs-3:

HL7: Health Level Seven

- ❖ founded in 1987 which issues
- ❖ application layer healthcare standards for the ***electronic exchange and management of health information*** such as clinical data and administrative information
- ❖ ***Work Groups*** addressing ***electronic health records, infrastructure and messaging, and imaging structure***. HL7 affiliate organizations, not-for-profit organizations incorporated in local jurisdictions, exist in over ***40 countries***
- ❖ Today, HL7 ***adopted by several national SDOs in U.S. and by ISO*** as a centre of gravity in international standardization and accredited as a partnering organization for mutual issuing of standards.



E-health SDOs-4

DICOM: Digital Imaging and Communications in Medicine

- ❖ standard for **exchanging** medical images and associated information between **medical imaging equipment made by different manufacturers**.
- ❖ widely adopted in equipment and information systems used in hospitals, imaging centers, and in providers' offices to produce, display, store, or exchange medical images.
- ❖ **20 DICOM working groups**, technical and medical professionals,

Open Electronic Health Records (OpenEHR) Foundation:

- ❖ OpenEHR was founded in 1998
- ❖ Promote and facilitate progress towards electronic healthcare for **high quality records**
- ❖ **OpenSource license** available for relevant EHCER source programs and datasets

E-health SDOs-5

SNOMED CT (Systematized Nomenclature of Medicine--Clinical Terms)

❖ comprehensive ***clinical terminology*** owned, maintained, and distributed by the International Health Terminology Standards Development Organisation (IHTSDO), a non-for-profit association in Denmark.

❖ SNOMED CT as a ***suite of designated standards*** for use in U.S. Federal Government systems ***for the electronic exchange of clinical health information respecting interoperability specifications*** of the U.S. Healthcare Information Technology Standards Panel.

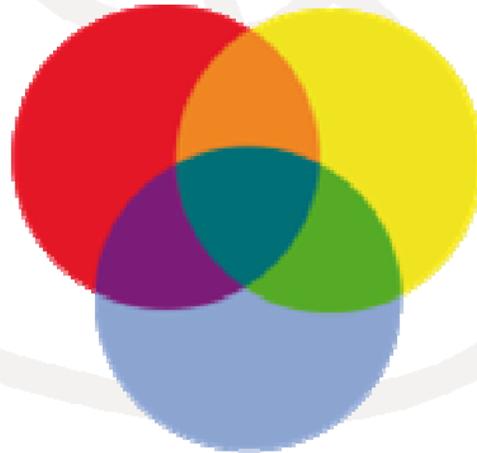


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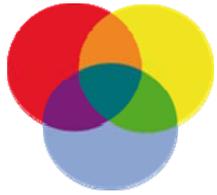
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**Conformance as a necessary but not
sufficient brick to build
Interoperability**





Interoperability

Key to participation in the 21st century global digital economy

- ❖ Effective e-Health services delivery requires more ***global eHealth interoperability standards***, overcoming technical ***infrastructure barriers***, and addressing ***privacy, security***, and other ***legal requirements***.
- ❖ Developing countries experiencing huge interoperability ***problems*** and rising frustration in ICTs
- ❖ Results in ***delay*** in full participation in the global digital economy and benefits
- ❖ ***Impacts*** economic and social development
- ❖ Developing countries demanding action by the ITU to redress the ***interoperability dilemma***





The ITU Global C&I Portal: find a reply to your needs

Basic C&I Concepts

- ❖ The ITU C&I Governing Rules
- ❖ Accreditation, certification, inspection, calibration (CASCO Toolkit)
- ❖ National Accreditation Bodies, MRAs and MLAs concepts for the market

The ITU-T C&I Programme

- ❖ The ITU approach to C&I
- ❖ The ITU Conformity Database
- ❖ The ITU Interop activities
- ❖ Capacity Building opportunities and Regional test centres
- ❖ The ITU Study Groups test suites development

Cooperation with ITU-T A.5 SDOs

- ❖ Best practices for testing

Cooperation with International Institutions

- ❖ Labs: ILAC/IAF
- ❖ Accreditation Bodies, Regulators, ITU Laboratories repository

Cooperation with International Organizations

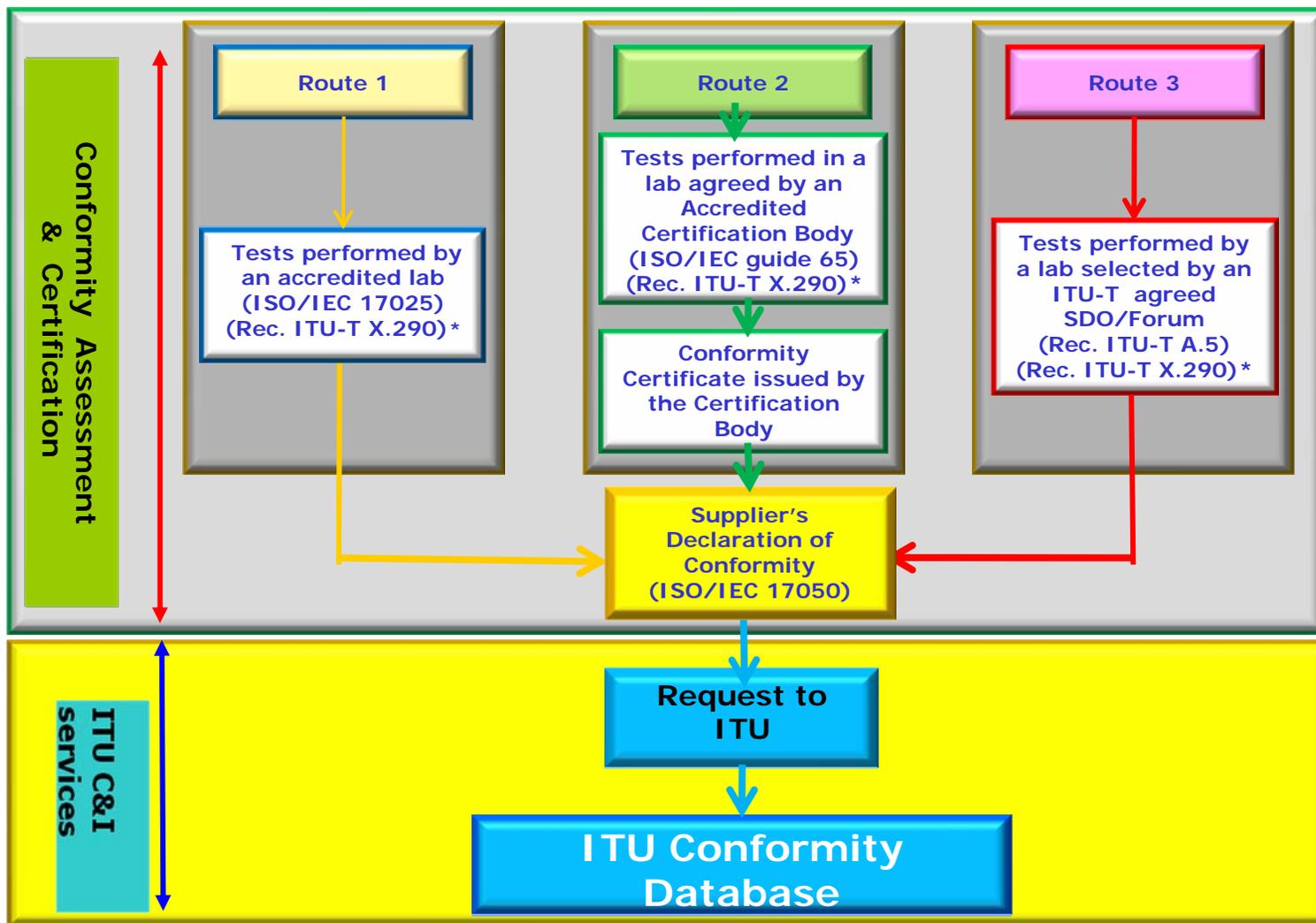
- ❖ ISO, IEC, (CASCO), BIPM, UNIDO, WTO

Consumers Associations

- ❖ Market needs from end users and civil society



Three routes to populate conformity db



(*) Rec. ITU-T X.290 - OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications



Conclusions

- e-Health key to ensure medical services to people regardless economical conditions and geographical situation
- ITU fully committed in encouraging a favorable e-Health international environment in cooperation with international institutions and organizations
- Harmonized globally interoperable standards fundamental to ensure global exchange of information for a better life



www.itu.int

<http://www.itu.int/ITU-D/ams/CMS/index.asp>



Muchas Gracias !





EXTRA SLIDES

ITU is committed to providing access to ICTs for all

UN Convention on Rights of Persons with Disabilities

www.un.org/disabilities/default.asp?id=150



Next world war in cyber space?

Privacy and Security



The Economist, July 2010

- Cybersecurity Information Exchange Framework (CYBEX)
- CIRTs
- IMPACT
- Global Cybersecurity Agenda
- Road map of security standards itu.int/ITU-T/studygroups/com17/ict/

ITU sectors & e-Health

ITU-D e-Health Related Mandate and Resolutions

ITU Hyderabad Action Plan [Programme 2](#) (2010): Cybersecurity, ICT applications and IP-based network-related issues

ITU [WTDC Resolution 65](#) (Hyderabad, 2010): Improving access to healthcare services by using information and communication technologies

ITU [PP Resolution 183](#) (Guadalajara, 2010): Telecommunication/ICT applications for e-health

ITU [WTDC Resolution 41](#) (Istanbul, 2002): e-Health including telehealth/telemedicine

ITU [WTDC Resolution 54](#) (Doha, 2006): Information and communication technology applications

ITU-D

Within the Development Sector, Study Group 2 (SG2) focuses on raising the awareness of decision-makers, regulators, telecommunication operators, donors and customers about the role of telecommunication and information technologies. Within SG2, Question 14-3/2 leads the work on telecommunications for e-Health. [To read more about Question 14-3/2 click: [Overview of the Question](#)]

ITU-T

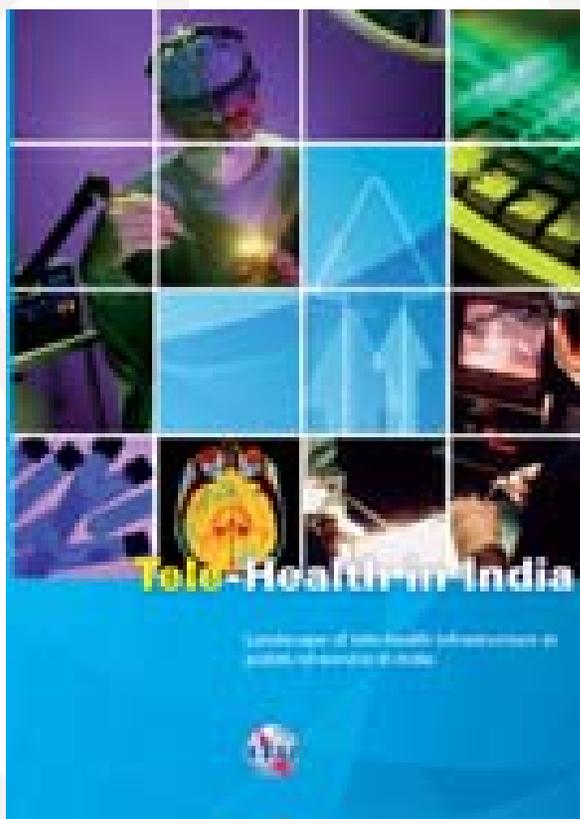
In order to allow a wide deployment of e-Health applications, it is important to achieve interoperability among systems and reduce the cost of devices through economies of scale. The development of global international standards with the involvement of the major players is a key factor to achieve these objectives. ITU coordinates the development of a set of open global standards for e-health applications through its standardization work. [To read more click [here](#)]

ITU-T Study Group 16 Question 28/16: Multimedia Framework for e-Health Applications ([Overview of the Question](#))

ITU-T Study Group 17 Question 9/17: Telebiometrics ([Overview of the Question](#))



Case Study: Landscape of tele-health infrastructure at points-of-service in India (2011)



The report identifies the activities, transactions and type of information exchange that take place within the health care activities. Various usage models and infrastructure employed at the point-of-care were surveyed from ongoing e-Health projects to identify the adoption pattern of connectivity and end-user platform technologies for various e-health services.

Belize e-health program

Program Goal and Objectives

The programme: encourage development, demonstration, promotion and possibly deployment on advanced networks, of leading-edge medical and health-related applications, specifically applications that would benefit from the capabilities of, and delivery using, advanced networks.

The goal: to facilitate the development and use of innovative applications of telehealth within the health care system.

The objectives:

- to encourage R&D projects that will develop or demonstrate advanced telehealth applications and services, and
- second, to foster diffusion projects relating to telehealth, (e.g. those designed to address structural barriers to the effective adoption and use of telehealth.



Advancements in remotely administered medicine

- virtual multimedia *delivery* of medical consultation,
- remote *imaging* services,
- specialized medical *diagnostics*, and
- remote medical *procedures*
- Standardized electronic medical *records for digital exchange* of patient data among a patient's primary care physician and other health providers,
- use of *genomic data* (e.g. genetic markers), as part of personalized electronic *health records*, to assist with diagnosis and treatment decisions.



The ITU Conformity Database

- Use of Current international procedures (ISO/IEC 17025, 17050, ISO Guide 65 - CASCO toolbox)
- Establish a database of conforming products and systems with robust credentials for participants
- Enables manufacturers and service providers to make a visible declaration that their equipment conforms to ITU Recommendations
- The database is open both to members and non-members
- The database contains only information entered directly by companies by means of an on-line tool: the Supplier's Declaration of Conformity (SDoC).
- ITU is not in a position to verify the accuracy of the information submitted by companies, who, in signing the SDoC take the full responsibility for its contents.

