ITU-T's work on Digital Health Standardization

Masahito KAWAMORI
Rapporteur, ITU-T SG16 Q28 “Digital Health”
Project Professor, Keio University

ITU-T Study Group 16 and its Question 28

- ICT standardization sector of ITU
- Lead group for multimedia such as audio, video etc.
  - Well-known standards such as H.264 and H.265 (HEVC)
- **Question 28** is tasked with E-health, digital health and telemedicine are important areas where multimedia and ICT can contribute
- Close collaboration with WHO
  - Focus Group on AI for Health
  - Joint work on “Make Listening Safe” Initiative
  - Joint work on Accessible Telehealth
- ITU-T provides a forum for discussion on standards among private sectors, governments and UN agencies

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ITU-T SG16, a3-time Emmy Award winner

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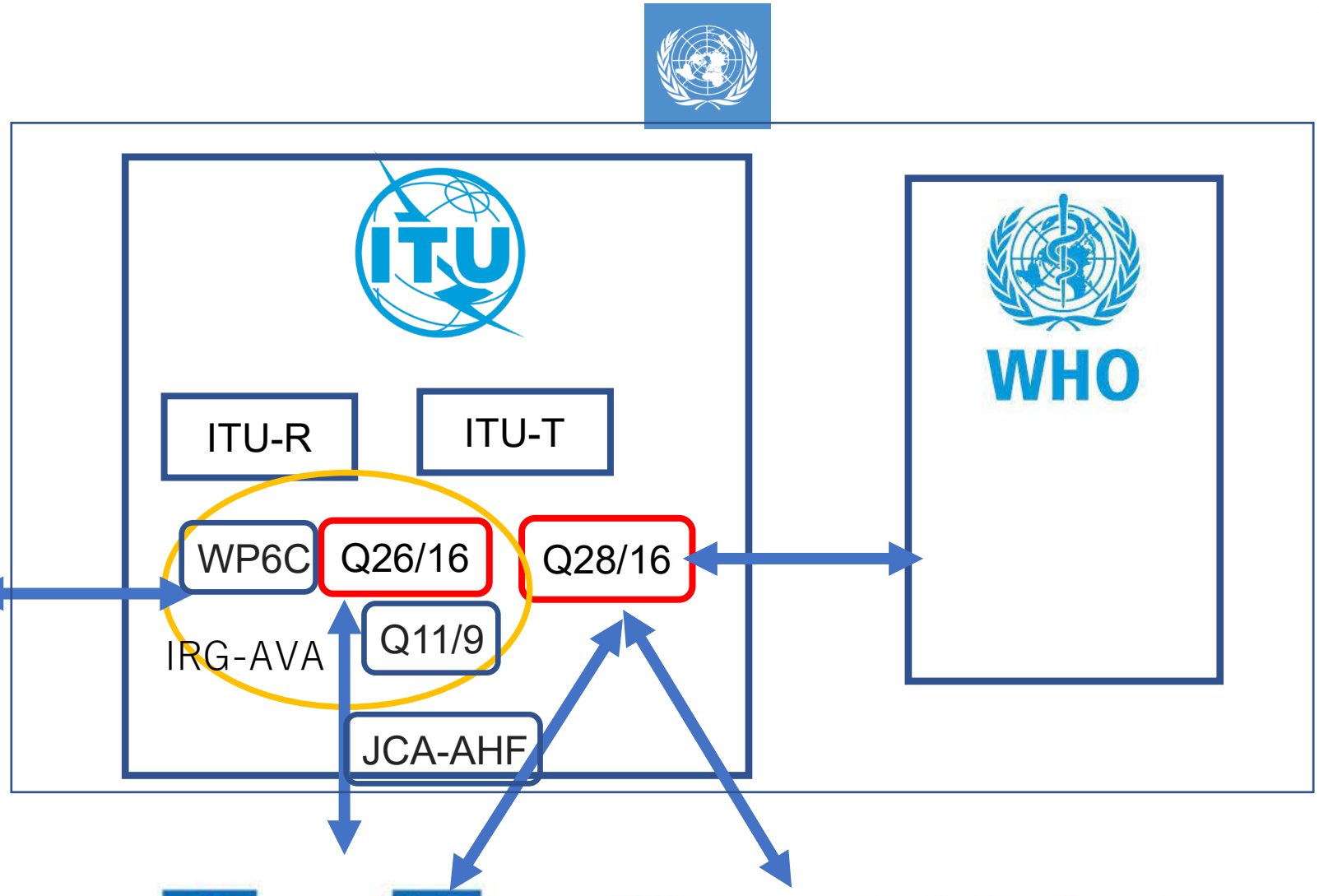
Collaboration with Many Groups



CES Consumer Technology Association

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ISO JTC1 IEC INFORMATION TECHNOLOGY STANDARDS

Joint Initiative Council

Collaboration with WHO

- ITU-T has been collaborating with WHO on developing many standards
- “Make-listening safe” initiative related standards and documents
- Accessible Telehealth-related standards and documents
- AI-related recommendations and documents

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Make Listening Safe

Make Listening Safe Initiative

ITU / WHO H.870 standard for manufacturers of audio devices

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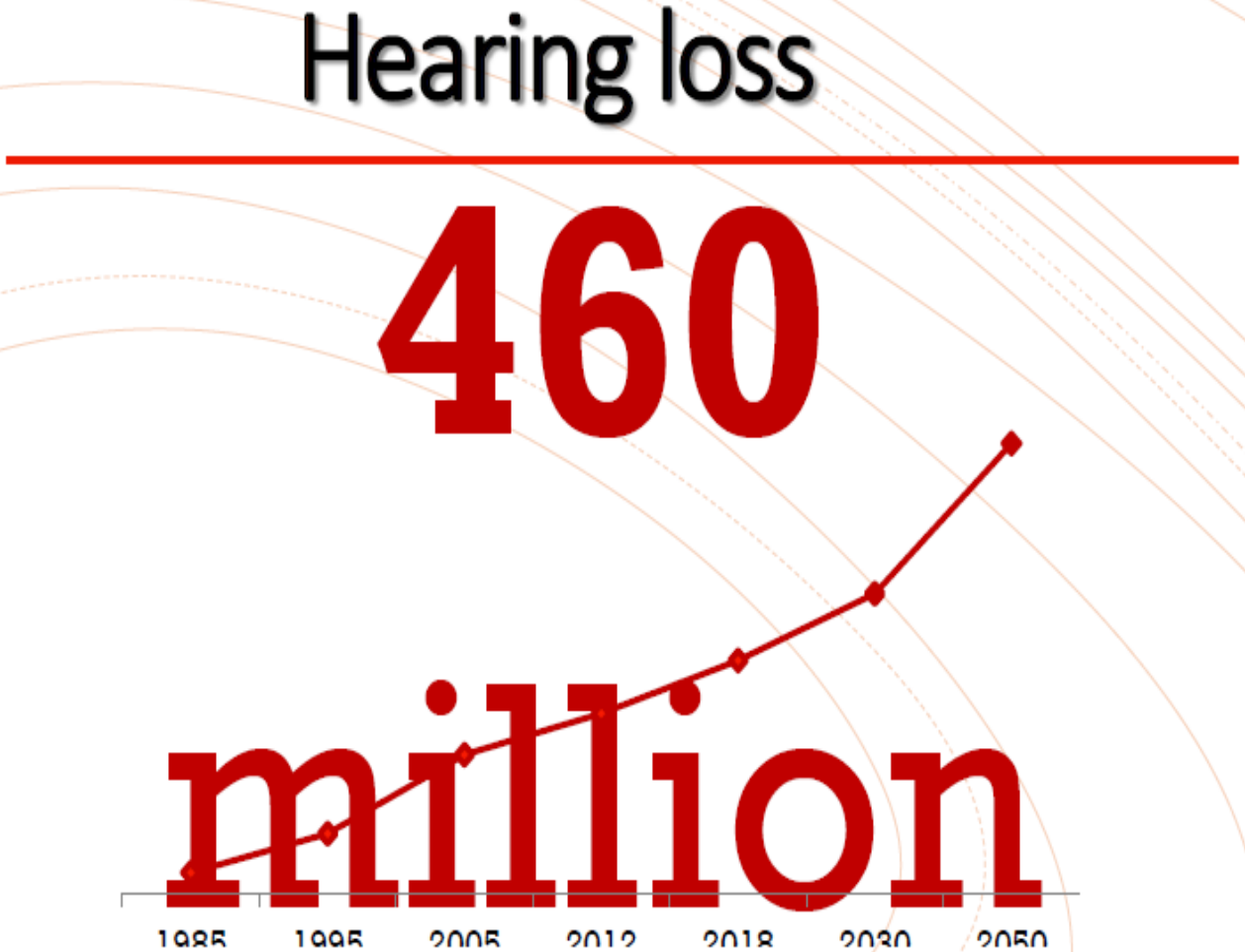
Background: Growing number of Hearing loss



Over one billion people are at risk of hearing damage due to unsafe recreational listening practices. To combat these risks WHO created the Make Listening Safe initiative in 2015.

World Health Organization

WHO-ITU Consultation on Make Listening Safe

- Started collaboration with WHO to gather experts on Hearing, including medical doctors, audiologists, manufacturers, etc.

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“Make Listening Safe”

- Standardizes the recommended amount of sound exposure (sound dosage)
- Primarily for music players and headphones
- The same standard principle can be applied to other services and devices

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ITU / WHO Standard "Safe listening devices and systems" (H.870)

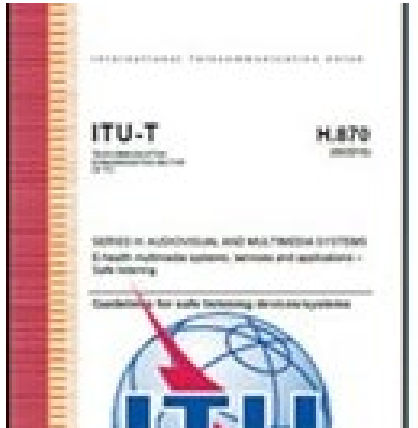
A WHO and ITU international standard

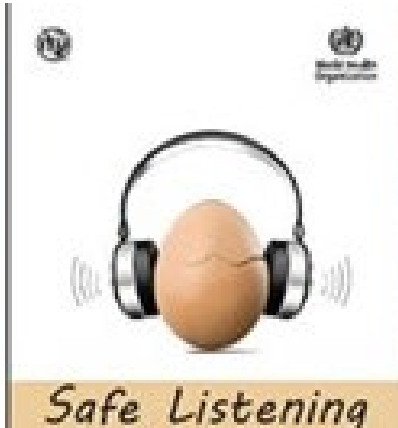
It has the same level as ISO and IEC *de juris* standards

ITU publication: "*Recommendation ITU-T H.870 (2018-08), Guidelines for safe listening devices/systems*"

WHO publication: "*Safe listening devices and systems*"

Free publications





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Dosimetry

- Based on the Equal Energy Principle, a 'dose' of sound energy is defined as the squared A-weighted sound pressure, pA, integrated over the exposure time $T=t2-t1$.

$$dose = \int_{t1}^{t2} (p_A(t))^2 dt$$

- This is line with other sound dose management standards:

  IEC 62368-1:2018 and EN 50332-3:2017

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Two Reference modes for Safe-listening

- Dosimeter tracks the user's exposure time and estimates sound level and the percentage that has been used up of a reference exposure limit
- References are as follows:
  - **Mode 1: 1.6 Pa2h per 7 days**
    - **Suited for general public**
  - **Mode 2: 0.51 Pa2h per 7 days**
    - **Suited for children and other sensitive individuals**

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Relationship between dB(A) and Dosage

Mode1

dB(A)	Weekly (1.6 Pa²h)
107	4.5 min
104	9.5 min
101	19 min
98	37.5 min
95	75 min
92	2.5 h
89	5 h
86	10 h
83	20 h
80	40 h

Mode2

dB(A)	Weekly (0.51 Pa²h)
107	1.5 min
104	3 min
101	6 min
98	12 min
95	24 min
92	48 min
89	1 h 36 min
86	3 h 15 min
83	6 h 24 min
80	12 h 30 min
77	25 h
75	40 h

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Adoption of H.870

- Available in 5 languages
- Already implemented by some manufacturers worldwide
  - Dosimeters are implemented by several organizations
- Referenced by other standards and specifications globally
  - Other specifications for e.g., PSAPs (personal sound amplifying products) are referencing H.870 and adopt some of its recommendations
- Strongly promoted by World Hearing Forum (WHF)
  - Involving the music industry and device manufactures to promote the standard as well as “Make Listening Safe” initiative

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Implementation on Smart Phones

“Hearing”

“Today”

“Headphone volume”

“7-day exposure”

Safe-Listening for Video and Esports (H.SL-ES)

- Using the same principle as H.870, makes recommendations on good Practice in video gaming and esports.
- WHO and ITU are jointly holding workshops starting in 2023, discussing with the gaming industry, e-sports organizations, and others.

Accessibility to Telehealth

- Defines the requirements of accessibility of telehealth services
- Important work to bridge the gap between mainstream telehealth and less privileged groups.

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Standards for Health Data exchange

- Health Data (including Electronic Medical/Health Record, Personal Health Records) is an important part of Telehealth
- ITU-T has a series of Recommendations on this aspects
  - This work has been carried out with Continua Health Alliance and IEEE
- ITU-T recently new work items on Person-Generate Health Records, as well as on health records in occupational settings

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Continua Guidelines and Test Specs.

- Defines test specifications and guidelines for data exchange for Personal Health Record with consumer products.

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Work on Health Data Exchange

- Framework for access permission of person-generated health records in digital health platforms
- Requirements and framework of occupational health service platform

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Use of Ultra-High Definition Imaging for Digital Health

- As the lead group on multimedia, ITU-T is developing standards for telemedicine using Ultra High-definition (UHD) video
  - 780.1: framework or telemedicine systems using ultra-high definition imaging
  - 780.3: Use cases and requirements or ultra-high-definition teleconsulting system

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Use of UHD video in telemedicine

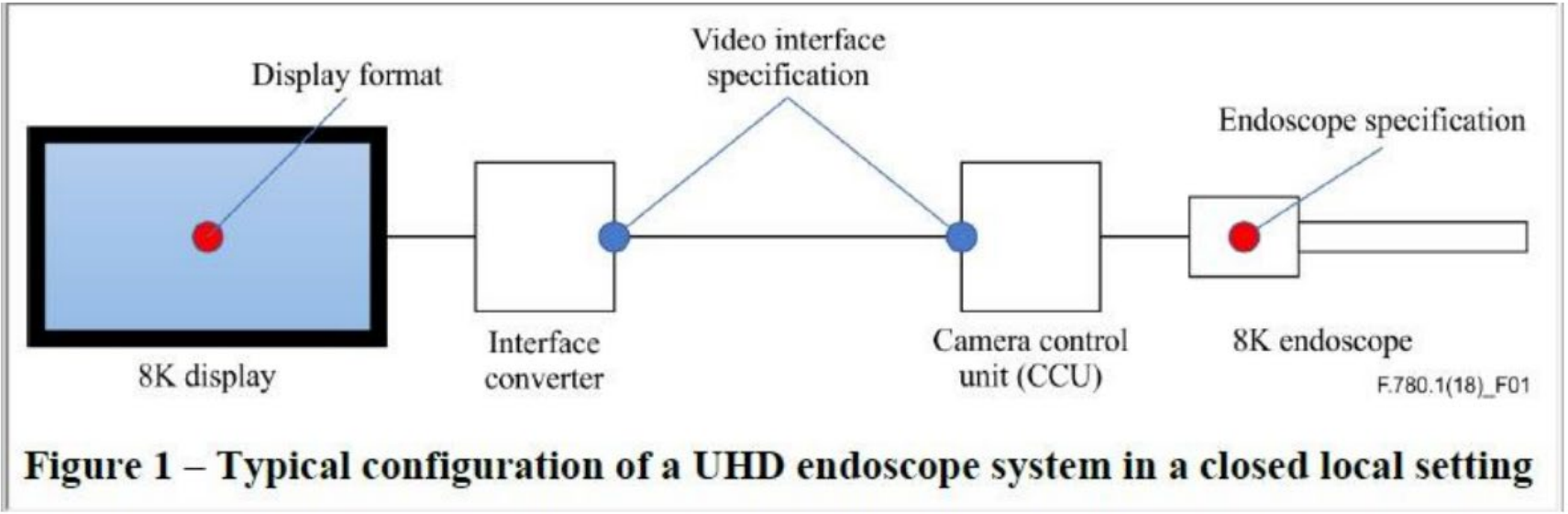

Figure 1 – Typical configuration of a UHD endoscope system in a closed local setting

- F.780.1: “framework or telemedicine systems using ultra-high definition imaging” standardizes protocols and recommended QOS of transmission for UHD videos for medical use

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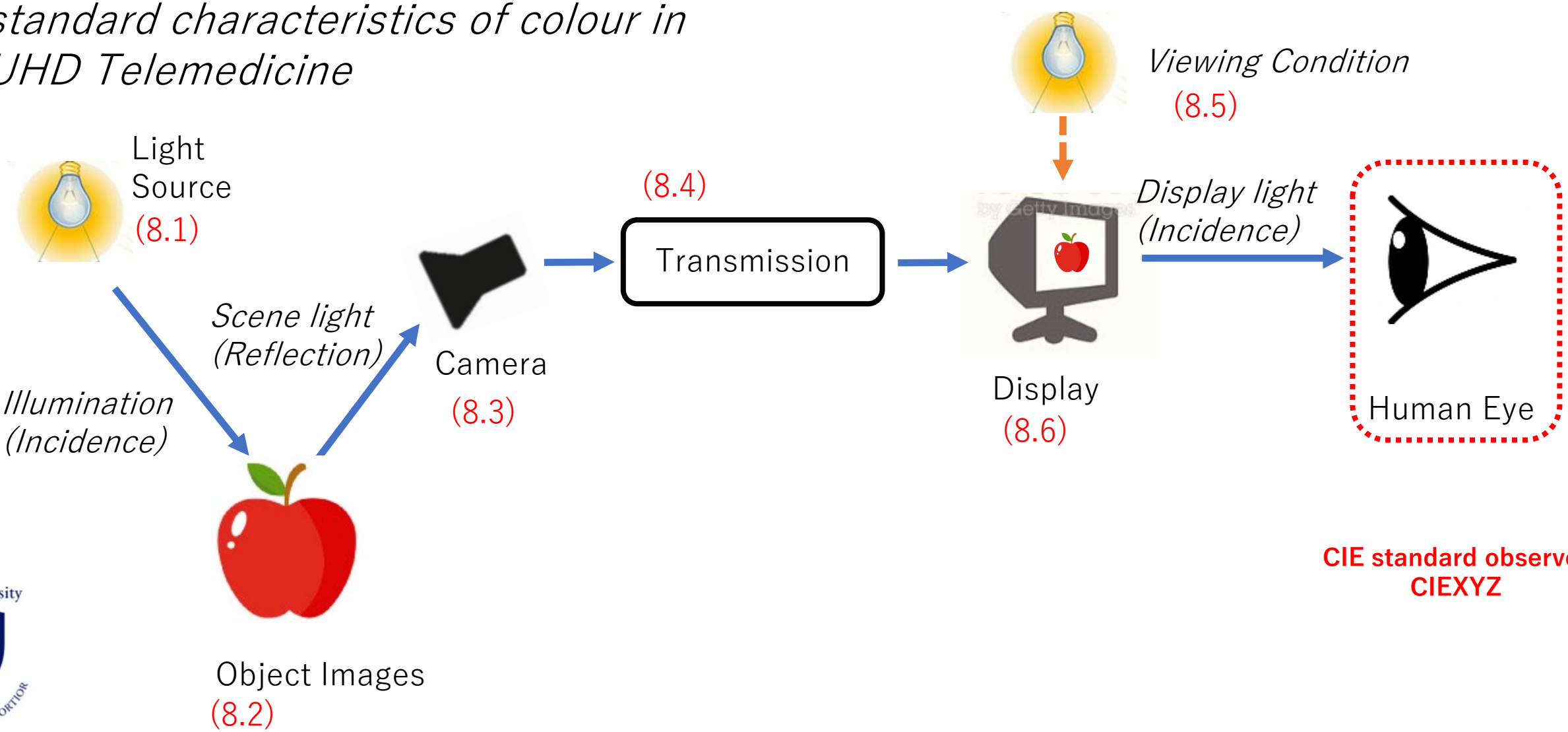
Medical Colorimetry for UHD videos

New Work Item: F.UHD-Colour defines standard characteristics of colour in UHD Telemedicine



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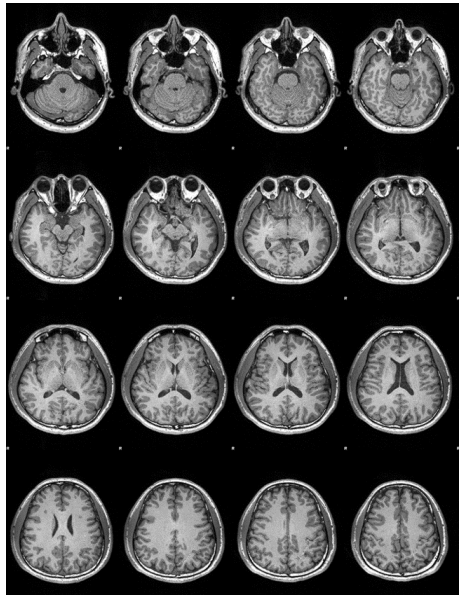
H.861.1 Brain Healthcare Quotient (BHQ)



BHQ

- H.861 provides a standardized way to monitor the health level of brain.

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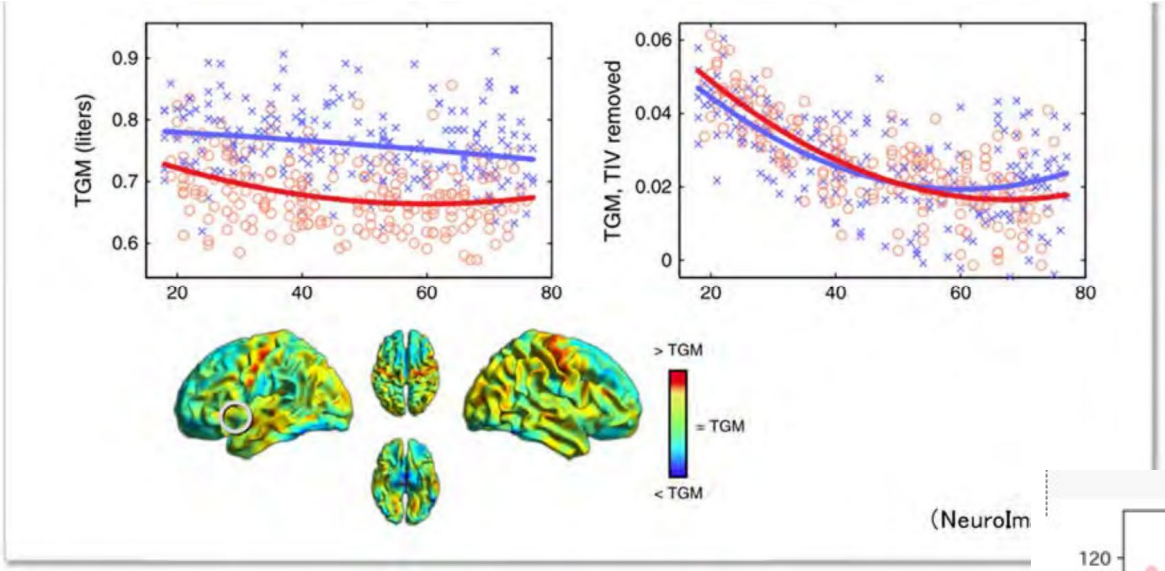
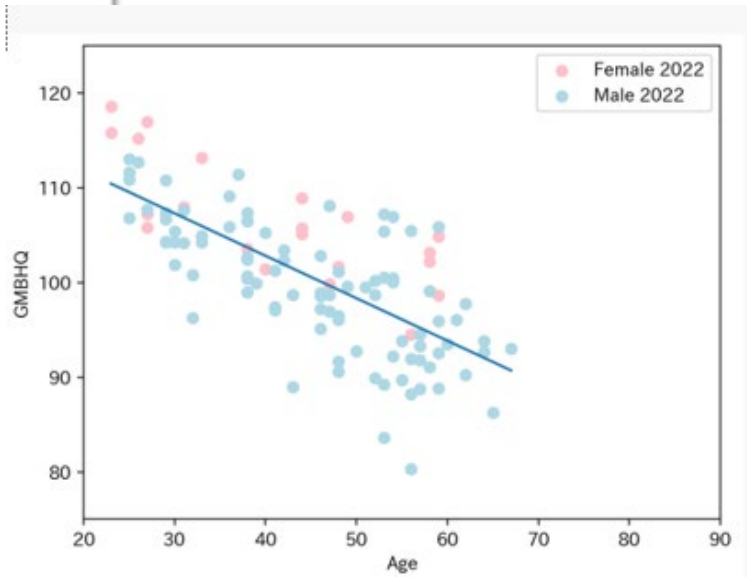
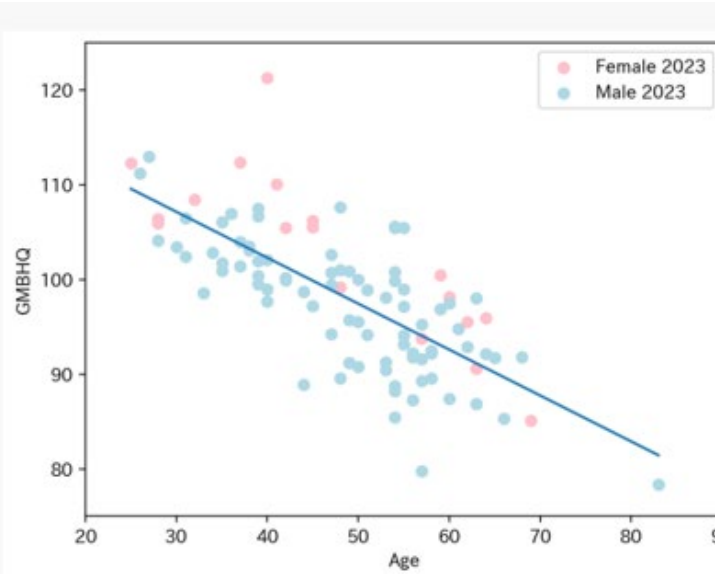
BHQ, Brain size and Aging



- BHQ correlates with brain size, indicating the changes with aging.
- Provides a standardized way to monitor brain





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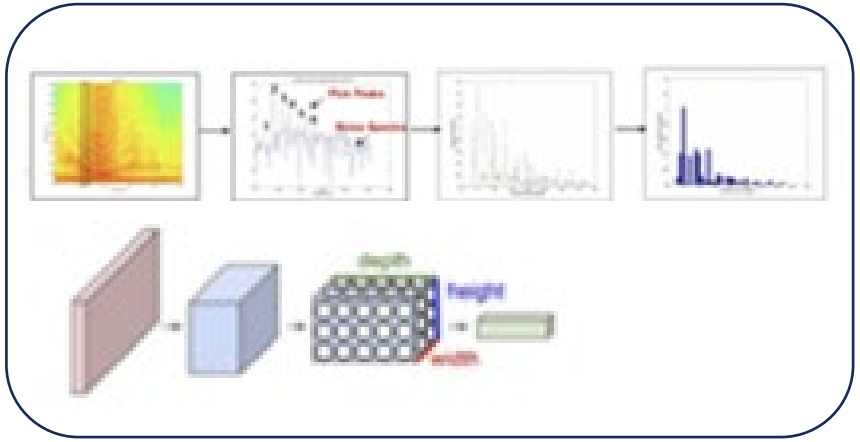
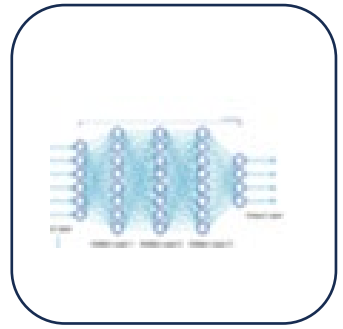
F.FAST: Stroke Detection:

data



data



- Data collection via Mobile devices (Face, Arm, Speech)
- Feature extraction
- Data analysis; Machine Learning

Stroke Severity Scale

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AI-related Work for Digital Health

- General framework of **quality control of medical images** for machine learning applications
- Quality assessment requirements for artificial intelligence/machine learning-based **software as a medical device**

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Digital Health for Emergency

- .760.1: Requirements and reference framework or emergency rescue systems
- .760.2 (drat): Requirements or user interface of first responders in emergency response support systems
- 780.5: Requirements, reference framework and use cases or telemonitoring systems in rapid deployment hospitals

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Collaboration with JIC

- Joint Initiative Council for Global Health Informatics Standardization (JIC)
- Working with DICOM on developing a compression method for time-series data with EEG,ECG,EMG,fMRI, etc,)

Thank you

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