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| **Abstract:** | This document contains the report of the fourth meeting of ITU-T Focus Group on Artificial Intelligence for Health (FG-AI4H). Revision 1 corrects affiliation mistakes by the secretariat. |

Executive summary

The fourth meeting of the FG was held in Shanghai, China, at the Shanghai World Expo Pavilion, 3-5 April 2019, preceded on 2 April 2019 by the fourth ITU-WHO Workshop on Artificial Intelligence for Health. About 150 participants attended the workshop and meeting.

The FG reviewed 41 input documents (34 proposals) and the following were the main results from the fourth meeting.

Mr Marcel Salathé (EPFL) resigned as a vice-chairman of the FG.

The meeting created a new WG on regulatory considerations on AI for health (WG-RC) to will help guide the FG in navigating the regulatory landscape; facilitating contacts, information exchange, and collaborative opportunities of the FG with regulatory bodies. The following initial management was appointed:

* Chair: Naomi Lee, The Lancet, United Kingdom
* Vice-Chairs
* Peng Liang, China National Medical Products Administration; [pengliang@cmde.org.cn](mailto:pengliang@cmde.org.cn)
* Paolo Alcini, European Union, European Medicines Agency; [paolo.alcini@ema.europa.eu](mailto:paolo.alcini@ema.europa.eu)
* Khair ElZarrad, United States Food and Drugs Administration; [mohammed.elzarrad@fda.hhs.gov](mailto:mohammed.elzarrad@fda.hhs.gov)

The FG updated its list of topic groups (one merged, three new):

* TG-Cardio: Cardiovascular disease risk prediction: Benjamin Muthambi (WatIF Health)
* TG-Cogni: Neuro-cognitive diseases: Marc Lecoultre (Business Investigation); Autism: Jongwoo Choi (Columbia Univ.)
* TG-Derma: Dermatology: Maria Vasconcelos (Fraunhofer Portugal)
* TG-Falls: Falls among the elderly: Inês Sousa (Fraunhofer Portugal)
* TG-Histo: Histopathology: Frederick Klauschen (Charite Berlin)
* TG-Ophthalmo: Ophthalmology (retinal imaging diagnostics): Arun Shroff (MedIndia, India)
* TG-Psy: Psychiatry: Nicholas Langer (ETH Zurich)
* TG-Snake: Snakebite and snake identification: Rafael Ruiz de Castañeda (UniGe)
* TG-Symptom: Symptom assessment: Henry Hoffmann (Ada Health)
* TG-TB: Tuberculosis: Manjula Singh (ICMR)
* New TG-Radiotherapy: Radiotherapy: Zhenzhou (Joe) WU (BioMind)
* New TG-DiagnosticCT: Volumetric chest computed tomography: Kuan CHEN (InferVision)
* New TG-Growth: Child growth monitoring: Open position

The FG renewed the mandate of two and created four new ad-hoc groups (AHGs):

1. AHG on test data set assessment - Co-chairs: Arun Schroff (MedIndia, India), Wojciech Samek (Fraunhofer HHI)
2. AHG on thematic classification scheme - Chair: Ramesh Krishnamurthy (WHO)
3. AHG Benchmarking Platform (AHG-BP) - ToR in [D-035](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-035.docx), Chair: Markus Wenzel (Fraunhofer HHI, DE)
4. AHG AI for health device security and robustness benchmarking (AHG-AI4HDS) - Co-chairs: Ziyi Yang (CAICT, China) & Kai Fu (China Telecommunications Technology Labs, China)
5. AHG working group methods for online collaborations - Chair: Benjamin Muthambi (Watif Health, South Africa)
6. AHG Data handling and data acceptance policy (AHG-DAH) - Co-Chairs: Benjamin Muthambi (Watif Health, South Africa) & Daidi Zhong (Chongqing University, CN) & Marc Lecoultre (Business Investigation, CH)

The FG issued the following output documents:

* D-102: Updated call for proposals: use cases, benchmarking, and data
* D-103: Updated FG-AI4H data acceptance and handling policy

The next meeting of FG will be collocated with the AI for Good Global Summit, in Geneva, Switzerland, Thu 30 May – Sat 1 June 2019 preceded by the Health Breakthrough track of the AI for Good Global Summit on Wed 29 May 2009. Updated information will be made available on the FG webpage, <https://itu.int/go/fgai4h>.

**Contents**

1 General 4

2 Approval of agenda and allocation of documents 4

3 IPR 4

4 Management matters 4

4.1 Creation of WG regulatory considerations 4

5 Report on Meeting C and update on interim activities 4

5.1 Report of meeting C and report to SG16 4

5.2 Ad hoc groups 4

5.3 Topic Groups 5

6 Outcomes of the workshop and tutorials 5

7 Update on projects, discussion of contributions 5

8 Advisory board 13

9 Working method discussions 14

9.1 Side discussion: creation / termination of new topic areas 14

9.2 Demonstration of teleworking tools 14

9.3 Online working methods 14

10 Outcomes of the meeting 14

10.1 New / extended ad hoc Groups 14

10.2 Updates for topic groups 15

11 Promotion and outreach 16

11.1 Planned promotional activities 16

11.2 Press communication 16

12 Schedule of future FG meetings, workshops and interim activities 16

13 Closing 16

Annex A: Agenda 17

Annex B: Documentation 18

Annex C: List participants 20

Annex D: ToR for the WG on regulatory considerations on AI for health 23

# General

The fourth meeting (Meeting D) of the ITU-T Focus Group on Artificial Intelligence for Health was kindly hosted by the China Academy of Information and Communications Technology (CAICT) on 3, 4, and 5 April 2019 at the Shanghai World Expo in Shanghai, China. It was preceded by the fourth ITU-WHO Workshop on Artificial Intelligence for Health at the same venue on 2 April.

# Approval of agenda and allocation of documents

The agenda proposed in [D-001](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001.docx) was adopted, together with the initial planned time slots for the various agenda items found in [D-001](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001.docx) Annex C. See Annex A for the final version.

The initial allocation of documents was found in [D-001](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001.docx) Annex B.

# IPR

The chairman briefed the meeting on IPR disclosure requirements. No declarations were made by participants.

# Management matters

FG Vice-Chair Marcel Salathé (EPFL) offered his resignation to the group in order to avoid conflict of interest situations over the participation of AIcrowd in the call for Benchmarking Solutions.

## Creation of WG regulatory considerations

[D-006](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-006.docx) contains the ToR of the proposed new WG on regulatory considerations on AI for health (WG-RC).

The meeting agreed with the creation of the new WG with the ToR in Annex D of this report, with the following management:

Chair: Naomi Lee, The Lancet, United Kingdom

Vice-Chairs

* Peng Liang, China National Medical Products Administration; [pengliang@cmde.org.cn](mailto:pengliang@cmde.org.cn)
* Paolo Alcini, European Union, European Medicines Agency; [paolo.alcini@ema.europa.eu](mailto:paolo.alcini@ema.europa.eu)
* Khair ElZarrad, United States Food and Drugs Administration; [mohammed.elzarrad@fda.hhs.gov](mailto:mohammed.elzarrad@fda.hhs.gov)

It was suggested that the FG consider involving the International Medical Device Regulators Forum (IMDRF, <http://www.imdrf.org/>) in the work of the WG-RC.

# Report on Meeting C and update on interim activities

## Report of meeting C and report to SG16

The report of Meeting C in [C-101](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-C-101.docx) was approved.

The FG-AI4H noted the progress report in [D-004](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-004.docx) presented to the FG-AI4H parent group, SG16, at its meeting in Geneva, 19-29 March 2019.

## Ad hoc groups

AHG on test data set assessment - Co-chairs: Arun Schroff (MedIndia.net), Wojciech Samek (Fraunhofer HHI)

[D-039](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-039.docx) "Aspects of evaluation procedures for machine learning algorithms" was presented.

AHG on thematic classification scheme - Chair: Ramesh Krishnamurthy (WHO)

No interim activity reports were provided to the meeting.

## Topic Groups

[D-005](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-005.docx), which collates all the calls participation issued by the various TGs, was briefly reviewed and noted.

At the end of the meeting, it was noted that the following updates need to be done:

* Simplify the expression with of interest by sending by e-mail a short bio to the secretariat.
* Discussion boards are being implemented on the ITU website under the FG-AI4H collaboration site.

# Outcomes of the workshop and tutorials

Workshop Summary in [D-002](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-002.docx) was presented by the workshop chair, FG AI4H Vice-chair Shan Xu. The document was noted.

Ms Weiling Xu, Director of Secretariat of ITU Working Committee, Ministry of Industry and Information Technology, China delivered a tutorial aimed at the Chinese delegation on how to actively engage in ITU activities in China, and to contribute to the Focus Group. This is found in [D‑027](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-027.docx).

# Update on projects, discussion of contributions

D-013: Intelligent Diagnosis System for Children’s Growth and Development Based on Deep Learning Technology; Hao Ni & Cong Fang (Yitu Healthcare), China

Presented an application to speed up analysis of X-ray images for detecting and prediction of bone growth anomalies in children. Currently undergoing clinical trials under the NMPA (formerly CFDA) certification process umbrella. Key issue is identification of undisclosed data sets that could be used to benchmark applications in this specific area; inputs are requested. The FG also calls for experts in this area, aiming at tools that could be used either regional or globally.

D-014: AI based Quality Control in Stroke Treatment Service; Huiqin Liu (Huimei Cloud Technology Co. Ltd.), China

Great progress has been made in stroke treatment in China, but still some problems are remained: (1) How to improve the low efficiency of hospital information system that delays the treatment; (2) How to improve the low quality of EMR data that affects data utilization and decision support; (3) How to extend quality medical resources to patients across the country. This article is expected to have a method to solve it.

Improvement of adherence to the key indicators that are used in EHR systems. How assess compliance pre- and post-AI.

AI to fill in the quality reports. Records, test data, raise alerts to possible oversights by the attending physician. This allows addressing omissions, problems, etc, while the patient is still at the hospital.

How to manage different check lists required by different hospitals? Can be customized.

How to apply this use case to the work of the FG? Inputs, outputs, data sets? Undisclosed data sets, anonymized. No rights to publish data.

Recurring theme: barriers to data access and sharing. Need a common approach as this is hitting different topic groups. Turn the process around – identified issues, solution for a relevant problem and/or identified by authorities of health.

D-011: Proposal of open-source benchmarking software: AIcrowd; Sharada Mohanty, Switzerland (remote)

Abstract: We present AIcrowd (<https://github.com/AIcrowd/AIcrowd>), an online machine learning challenge platform which can accept code contributions from participants and orchestrate them against private datasets for benchmarking, or evaluation using pre-agreed evaluation metrics. The platform comes out of an academic project at EPFL, called crowdAI, which was successfully used in the past to run in a scalable way numerous complex competitions involving collection and orchestration of machine learning models from thousands of users. Guidelines provided by AIcrowd help participants package the software runtime of their code in an easy way, enabling reproducibility and stability of orchestration with a very low barrier to entry. The AIcrowd evaluation setup does not expect the sensitive datasets to leave the trusted compute infrastructure and network of its creators (or a neutral middleman). The evaluator ensures that that models and the datasets interact in a secure environment where the participant-submitted code cannot interact with the external network.

The platform can be run on private clusters (e.g. UNICC based), not necessarily using public providers.

No need to disclose data, can collect sub-datasets and use them for a particular benchmarking. Model and dataset interact in a safe environment. Use is free for academic and non profit use, but if development is necessary, there would be need to cover the associated costs, AIcrowd offered to help with setup.

How do models interact with data container. Create a private data repository.

The presentation was followed by discussions about the benchmarking platform:

* Platform chosen would not be mandatory, but would be a tool to help perform the benchmarking for frameworks of the different Topic Areas.
* FG agreed to study further this platform.
* Call for proposals (B-102) was updated as found in [D-034](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-034.docx) and issued as output document in [D-102](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-034.docx). It is expected that the call text will be further reviewed at Meeting E;
* Create an ad hoc group to further discuss how the AICrowd platform works and could be used for the FG activities.

D-044: Topic Group "Histopathology", Frederick Klauschen, Germany (Remote)

Review of the objective of the topic group: need an algorithm to provide good quality estimates on counts of tumour cells in histopathology images. Annotations needed for positive annotations (tumour cells found) as well as negative annotations (no tumour cells).

Issue on how many pathologists are needed to independently annotate images to make it "certification grade". Currently, Charité Berlin's messages are annotated by three pathologists; FDA is likely to require seven, but it is not yet decided. Charité Berlin may resource to crowdsource by volunteers from societies of pathologists. Need to ensure that confidentiality of the dataset is maintained.

Dataset available to third parties.

Looking into the dataset size required to make the data set enough for certification purposes.

Assurances will need to be provided in writing from data providers (did not share private data) and model submitters (did not see private data). A form will be prepared for this purpose; an ad hoc group was tasked to draft the two forms.

D-029: Topic Group "Snakebite and snake identification", Rafael Ruiz de Castaneda, Switzerland (Remote)

The document provides project updates. Number of annotations expert herpetologists per image varies from 10 to 20.

D-028: Topic Group "Psychiatry", Nicolas Langer, Switzerland (Remote)

Data to be made available: Demographics, cognitive data, behavioural data, resting EEG.

How independent these data sets would be in training. Data set from NY institution needs to be ensured to be private.

[D-018](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-018.docx): Automated Generation of Radiotherapy Treatment Plans using Reinforcement Learning, Hu Yue & Joe Wu (BioMind China), China

Abstract: Besides surgery and chemotherapy, radiotherapy is one of the techniques frequently used in the fight against cancer. Over the years, advanced techniques such as intensity modulated radiotherapy (IMRT) and volumetric modulated arc therapy (VMAT) have been developed for radiation delivery procedure. Regardless of the type of delivery mode, a radiotherapy treatment plan needs to be generated first. We use the approach of reinforcement learning to automate the treatment plan generation process to achieve auto-planning better than most dosimetrists.

AI tools for developing a radiotherapy treatment plan. Solution integrated into the machines delivering the treatment.

Different data sources are needed for model development and testing/benchmarking. Identify more people to collaborate and exchange data / cross-test. Do you have data you can release? Current data, mainly Chinese patients; not tested in other ethnic groups.

Need to take care of outliers, that would need to be part of the test data.

Agreed to establish a new topic area on Radiotherapy Treatment Plans. Topic driver: Zhenzhou (Joe) WU (BioMind)

D-038: Topic Group "Ophthalmology (retinal imaging diagnostics)", Arun Shroff, MedIndia, India (Remote)

Review of the status of the topic area discussions. Metrics proposed: Sensitivity and specificity of at least 80% and 95% respectively, with a technical failure rate of less than 5%.

D-039: Aspects of Evaluation Procedures for Machine Learning Algorithms Update on Adhoc Group on "Test Data Set Assessment", Arun Shroff, MedIndia, India (Remote)

Review of the status of the topic area discussions. Metrics proposed: Variety of metrics, since they are to a high degree use-case dependant.

D-040: Baidu Ophthalmology update - Issues, methods to Test data set assessment, Frank Wu, China

The document discusses possible approaches and recommendations to address the following problems previously identified by the FG: methods to create representative subset from a given dataset.

Frank [Baidu]: Scope is restricted to DR, not to ophthalmology. Suggestion for various modalities to be covered in the TA-Ophtalmo. Single-task, multi-task imaging. Baidu has a platform for challenges, see <https://eye.baidu.com>.

D-020: Proposal: Applying AI to provide clinical decision support, Chao Lu & Yanwu Xu & Jingyu Wang (Baidu) & Dong Min (CAICT), China

Abstract: This submission is in response to the ITU-T Focus Group on Artificial Intelligence for Health (AI4H)’s call for proposal on use cases and data. It presents a solution by using AI technology for clinical decision support. Clinical decision support system (CDSS) is an essential assistant tool to increase the primary healthcare level and benefit the patients, doctors and the public health management. It is a critical need and going to be deployed into thousands of primary clinics in China. However, there is still no international standards for this kind of systems, and even no well-defined interface to various hospital information systems (HIS).

Two single topics presented at the workshop (Zitu on bone growth and y on stroke). Architecture for global diagnostics. Can address a more generalized approach with Ada's by combining free text to symptoms, and from symptoms to diagnostics.

Described benchmarking aspects, evaluation metrics.

D-017: Wearable Health Devices, Xiang Ding & Chengwei Li (National Institute of Metrology China), China

Abstract: Since the aging of population became a worldwide problem, chronic disease management have been drawing more and more attention from the public and governments. Wearable health device is a potentially powerful tool in chronic disease management and disease prevention. However, currently there is no available international standard or guideline for evaluating the accuracy and reliability of data, the stability of device or the compatibility of data interface. Data transfer and sharing mechanism are difficult to be established without available standards. Standardization is necessary for both manufacturers and users of wearable health devices. An initial plan of drafting a series of standards, guidelines and specifications is proposed, in order to support the manufacturing industry, facilitate the acquirement of daily medical service by the general public and promote the development of medical big data technology. All interested parties including manufacturers, hospitals, metrological institutions, regulators and third-party inspectors can be convened together to carry out that work. The series of standards are expected to cover topics including the minimum requirements of wearable health devices, terminology, evaluation of the device performance, evaluations of the data effectiveness and reliability, data collection, data transfer and so on.

It was pointed out to the submitters that this is not in the scope of this FG. Submitters were encouraged to get familiar with the SG16 work and join the work of Q28/16 on e-health systems and services. There is extensive international work, e.g. ITU-T Recommendation series H.810 (Personal connected health devices), IEEE PHD and PCHA.

D-019: Suggestions on data quality evaluation of AI for health; Wenli Liu & Chengwei Li (National Institute of Metrology China), China

Abstract: AI for health is inseparable from medical big data. Only when medical health data is accurate and reliable can we ensure the validity and reliability of diagnostic results or services obtained from AI technology. We recommend that data quality evaluation for health artificial intelligence should focus on three areas, including quality control of medical devices, standardization of medical big data, rationality and effective use of medical big data. Equipment control should be carried out through first verification and daily quality control. With the effectiveness of medical big data, we began to establish and improve the standard system and strengthen the training of data collectors. Developing comprehensive, uniform and reasonable international standards for different types of AI medical services and supervision of medical big data is the final and also key part in the chain.

Issues raised that are relevant to many topic areas. Authors are encouraged to review the FG document [C-103](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-C-103.docx) with the latest version of the FG-AI4H data acceptance and handling policy.

D-016: Topic Group "Symptom assessment", Henry Hoffmann, Germany

Document provided a summary of the activities under the topic group on symptom assessments. They plan on establishing subgroups within topic groups to address a wider variety of use cases.

The topic driver informed that Baidu agreed to contribute to the work of this topic group.

D-012: Automatic Generation of Diagnostic Reports for PA Chest disease on Pneumothorax, Pleural Effusion, and Rib Fractures, [Harry] Shuyuan, Zhang & Fengbo, Xie (Wingspan Healthcare Group), China

Abstract: Pneumothorax, pleural effusion, and rib fractures are common lesions in the chest and can be initially screened by diagnostic reports (DR). In a country with a large population like China, doctors need to read hundreds of images every day. These jobs not only take up a lot of their time, but the process of writing medical image reports is too complicated and tedious, also not all have enough training. The more serious problem is that most of the patients are at the community (grassroots) level, and most of the excellent medical resources are concentrated in the first- and second-tier cities. This leads to too low medical service capacity to bear excessive workload, and the patient's diagnostic efficiency and diagnostic quality cannot be guaranteed. AI-assisted reporting for chest radiography, which is based on DR, automatically generates an imaging performance report based on DR's chest image, which enables full-process diagnosis of reading, diagnosis, and report reporting. It can be widely used in patient-related medical examinations, which significantly reduces the operating costs of medical institutions and effectively improves the level of primary medical services.

Feasibility, comparison of results indicates that in 50% of cases, AI and radiologists provide similar diagnostics; for 20%, AI is better, and for 30% a radiologist is better. It is expected that improvement in the model with more high quality

D-023: Suggested Draft Terms of Reference for Working Group on Public and Global Health Considerations, Monique Kuglitsch (Fraunhofer HHI), Germany

Abstract: This document contains a proposed Terms of References for the FG-AI4H prospective working group on public and global health considerations to bring together representatives of national public health institutes (NPHI) (and similar organizations). The working group would provide a forum where the major health issues affecting individual countries can be shared. This encourages an exchange of information among representatives and opens the lines of communication with regulators, healthcare specialists, and AI developers. This will also reveal the most pressing health issues on a national, regional, and global scale, providing direction for ongoing FG-AI4H activities.

The objective is to have this group as an additional source of identification of topic areas / use cases that are relevant to public health in different constituencies.

Benjamin: important initiative to include view from public sector to guide the work of the group to increase representativeness.

Encourage online collaboration as the primary collaboration method, instead of presential participation. Maybe should use the same online platform that will be used for the topic groups.

Reach out to national public health institutes, e.g. using WHO. Ensure WHO is involved and that we are reaching out to the right people.

FG participants invited to review the progress and provide feedback. More discussions would be held if needed.

D-030: Topic Group on TB - Manjula Singh, India

Overview of topic area. Objective: early detection (based on chest x-rays) for more effective treatment. Still in initial stages of organizing the area for further work: how much data, what would be reliable data sources, reduce false positives (because of scarcity of medicines as well as adverse side-effects of applying the wrong medicine). Data sharing policy is a key area to be addressed. Need to enlarge the community of participants in the topic group.

Validation of TB cases by two medical doctors. For some uses, a certain amount of false positives would be acceptable - for example population / prevalence statistics.

Thomas: Common issue, make publicly known the call for participation in the topic groups. Need to recruit expert panels.

D-015: AI-Based Mining and Testing Tool for Smart Health Device Vulnerability, Kai Fu & Ziyi Yang & Chunxia Hu (CAICT), China

Abstract: With the popularity of smart health devices, security issues such as data tampering and information leakage are becoming more and more serious. Currently, lacking mining and testing tools for vulnerability, which are directly applied to health device, making the situation worse. In order to deal with the situation, detecting and fixing the vulnerability in advance become more essential. Our research aim at using AI to establish a set of vulnerability mining and testing tools through three stages: firstly, establish device vulnerability libraries; secondly, build algorithmic models for specific device and protocols, then develop vulnerability mining and testing tools; thirdly, extend targeted models to general models to help with various kinds of health devices.

AI tools to detect vulnerabilities in health devices.

Evaluation of the service of the services while providing the AI services, not only related to cybersecurity.

Where do the security risks on which this activity would be focusing come from? Coding; algorithm; malicious attacks? What is the difference between security risks and bad algorithm/model. IT security. Automation of detection of know types of problems / vulnerabilities. Horizontal benchmarking tools that complement the benchmarking in terms of medical relevance performance (which are vertical within a topic area). Another set of benchmarking tools.

On the idea to create a Working Group, it was felt the FG needs to understand the scope besides security, e.g. metrics and robustness. Better to use the ad hoc mechanism before creating a WG.

It was agreed to create an ad hoc group on *AI for* *health devices* *security and robustness benchmarking* towards identifying the best way to handle this horizontal topic/activity, aiming to:

* focus on metrics and tools for benchmarking security and robustness of AI-based health solutions
* e.g. investigate how one can maliciously modify input signals to make a health application fail
* collect inputs from the regulatory group on relevant requirements
* draft and issue a call for participation in this work

Co-chairs: Ziyi Yang ([yangziyi@caict.ac.cn](mailto:yangziyi@caict.ac.cn)) , CAICT, China; Kai Fu ([fukai\_6@163.com](mailto:fukai_6@163.com)), China Telecommunications Technology Labs, China.

It was also agreed that the TDD template should be updated to include robustness as a parameter to be considered.

D-031: Topic Group "Cardiovascular disease risk prediction", Benjamin Muthambi (WatIF)

Progress report on the TG Cardio. Instead multiple calls for participation, instead of a single one. Decision to issue postponed till this meeting, to gather feedback.

Thomas: This is in line with the idea to create experts panels. Good step forward. Encouraged the TG leader to collect ideas to help generalize for other topic groups, who agreed to provide examples of the more specific calls for further consideration by the other TGs.

D-032: Topic Group "Neuro-cognitive diseases", Marc Lecoultre (Business Investigation), Switzerland

Progress report on the TG "Neuro-cognitive diseases". Issued calls for participation. Next steps: onboard new proposals, refine TG description, release public dataset for AD, prepare private undisclosed dataset.

Issue: what to do with it, how to publicize it beyond personal networks and known mailing lists. Thomas: Asked WHO to circulate it. Use the AI4G Summit to publicize the various TGs.

Topic Group "Autism" (Jongwoo Choi does not attend meeting)

There has not been follow up since the use case was adopted. Decided to address any suggested use cases related to autism under the TG "Neuro-cognitive diseases".

D-021: Proposal to add new contents into FGAI4H-C-103: FG-AI4H Data handling and data acceptance, Daidi Zhong (Chongqing University), China

Abstract: This document suggests some modifications and additions to the FG-AI4H Data handling and data acceptance policy in document [FGAI4H-C-103](https://www.itu.int/en/ITU-T/focusgroups/ai4h/Documents/FGAI4H-C-103.pdf). The purpose is to further help the data users and regulators to better understand the nature, origin and quality of the data leveraged by the very AI product.

The various proposals were discussed and changes agreed into the data handling and data acceptance policy document as found in D-033, to be reissued as D-103.

I was agreed that the co-chairs of the data handling and data acceptance AHG (Markus Wenzel and Marc LeCoultre) will progress the draft revision in D-033.

D-022: Proposal to change the structure of FG-AI4H-C-105: TDD template, Daidi Zhong (Chongqing University), China

Proposal to refine the TDD template, to add structure for subtopics. Should allow both options.

D-036: Topic Group "Dermatology", Maria Vasconcelos, Portugal [Remote]

Overview of the topic group activities. Need help to extend the list of collaborators. Suggested to check previous contributions to identify some collaborators (e.g. FirstDerm? that presented at the 1st FG AI4H meeting).

D-037: Topic Group "Falls among the elderly", Inês Sousa, Portugal [Remote]

Reviewed the topic area scope.

There is some data that can be made public for training. Need someone to follow the established protocol for data collection and generate private validation data sets. Thinking of extending the scope to include senior fall detection; they have data but this is to be kept private.

[D-024](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-024.docx): Proposal of an AI Quality Control system: InferRead CT Chest, Mengli Xu, InferVision

Abstract: InferRead CT Chest is both a ‘horizontal’ as well as a ‘vertical’ solution for assisted diagnosis and quality control for chest CT imagery. It is horizontal in the sense that our AI can cover evaluation of multiple types of diseases, and it is vertical in the sense that our AI can dive through multiple stages of diagnosis of a single disease, providing a full suite of assistance in detection, diagnosis and treatment. A broad range of technologies are involved in this program, including: 1) classification and matching algorithms based on deep learning neural networks; 2) The integration of deep learning algorithms and radiomic feature extraction; 3) Multi-modal data synthesis based on both imaging and NLP. This proposal proposes the development of the InferRead CT Chest in order to explore the standardization of AI in the field of medical imaging.

Demand for imaging analysis is increasing at a much faster rate than the formation of radiology professionals. Current deployments are in clinical trials in a number of hospitals.

Authors were invited to resubmit the proposal with a clear indication of what proposal for the focus group would be.

Agreed to create a Topic Group TG-DiagnosticCT Computed Tomography of chest images, Topic driver: InferVision

D-025: Proposal of an artificial intelligence research platform: InferScholar Center, Mengli Xu, InferVision

Abstract: This document presents InferScholar Center, a proprietary artificial intelligence research platform especially designed for medical researchers developed by InferVision. InferScholar Center integrates GPU server, user management module, medical database, image labelling tool, deep learning (neural network) module, multi-centre (transfer learning) module and radiomics module. The platform offers an interactive interface and even medical researchers with no coding background are able to easily finish the full process of AI research. In deep learning module, more than 50 mainstream deep learning algorithms are optimized for medical images and embedded into the platform. The researchers can train models for classification, detection, and segmentation problems with these algorithms. They can also import/export trained models and conduct transfer-learning among different centres. In radiomics module, more than 4,000 features are extracted from each lesion, and classification models are built with the statistical analysis and machine learning tools. InferScholar Center can analyze medical texts like EMRs, and all kinds of medical images, including X-ray, CT, MRI, PET/CT, pathological slides. Therefore, it can be applied to a wide range of medical fields, including oncology, cardiology, neurology, respiratory diseases etc. With InferScholar Center, medical researchers can use a wide range of tools and thus promote the development of multidisciplinary AI researches.

This is a prototyping platform for doctors, it is not a platform where benchmark could be used. InferVision has future plans to make it a communication platform for a marketplace of models.

Concerning suitability of this platform for the FG-AI4H work, clarifications are needed on the availability of the platform as open source, as well as whether it could be hosted in an international platform as discussed before, under a UN organization. The information currently available (in particular, regarding the two aspects in the previous sentence) does not indicate this would be a suitable platform for the FG-AI4H operations.

D-026: Policy principles for AI in health – Global health AI strategy

Abstract: Machine learning and artificial intelligence/augmented intelligence (AI), powered by streams of data and advanced algorithms, have incredible potential to improve healthcare, prevent hospitalizations, reduce complications, and improve patient engagement. Yet, applications of AI in healthcare have also given rise to a variety of potential effects and challenges for policymakers to consider, including notice/consent, bias, inclusion, transparency and digital due process, and law enforcement access to data, among others. To proactively address these challenges, the Connected Health Initiative formed its Health AI Task Force in mid-2018. The Task Force, after consultations with experts from academia, industry, and government, released a series of living deliverables in Feb 2019: a position piece supporting AI’s role in healthcare, a set of principles addressing how policy frameworks should address the role of AI in healthcare, and a baseline terminology document. Notably, the Task Force’s efforts were informed by a number of innovators in the diabetic retinopathy space. The CHI Health AI Task Force’s deliverables, and the diabetic retinopathy use case, will assist the FG-AI4H in its efforts in its consideration of government’s role. The CHI would also appreciate FG-AI4H’s feedback on its deliverables.

The document was noted.

# Advisory board

The FG chair suggested to establish an advisory board with distinguished experts from the areas of medicine, artificial intelligence and machine learning, ethics, applications, regulation, statistics, ontologies, law, and other areas that are relevant for the activities of the focus group.

The mandate of the advisory board would be to provide the focus group with knowledge, experience, and their network, and to enhance the focus group with views from different angles.

In particular, the advisory board would be expected to support the focus group's management, topic group drivers and working group chairs as knowledgeable points of contacts.

Advisory board members are appointed at focus group meetings, are invited – but not bound – to attend workshops, meetings, and management conference calls, and make their contributions in an honorary capacity, pro bono and without obligations.

# Working method discussions

## Side discussion: creation / termination of new topic areas

If creating topic areas increases the chances of identifying more data sources, it might be worthwhile to do so. This aspect needs to be further discussed.

It was observed that several topic areas (formerly *use cases*) did not receive updates since the meeting when they were established.

It was proposed that topic groups that do not receive inputs for two meetings should me moved out of the website, and eventually dropped out or merged within another related topic group.

## Demonstration of teleworking tools

TSB demonstrated briefly the pages and tools being prepared for online use by the topic groups.

## Online working methods

The need for an online forum around each of the topic groups was noted, however keeping in mind that some topics are cross-cutting.

It was agreed to set up an ad hoc group to develop working group methods for online collaborations, chaired by Benjamin Muthambi (Watif Health, ZA). The AHG will liaise with WG-O and TSB.

Aspects to be taken into consideration.

* More friendly website.
* Open access documents
* Online collaboration tools
* Onboarding material:
* rules of engagement (disclosure of interests, documentation, etc)
* clarifying what is expected in contributions, etc.

# Outcomes of the meeting

A 1-week editing period was agreed for the output documents (Fri 12 April 2019):

* D-101: Meeting Report
* D-102: Updated call for Proposals: use cases, benchmarking, and data
* D-103: Updated FG-AI4H data acceptance and handling policy

NOTE – Changes to the TDD template were discussed (see above under [D-015](#TDD1) and [D-022](#TTD2)), but a draft was not prepared as outcome of the meeting. An [updated text](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-E-007.docx) would be prepared for Meeting E.

## New / extended ad hoc Groups

The following existing AHGs were reinstated:

* Test data set assessment - Co-chairs: Arun Schroff (MedIndia.net), Wojciech Samek (Fraunhofer HHI)
* Thematic classification scheme - Chair: Ramesh Krishnamurthy (WHO)

The following new AHGs were created:

1. AHG Benchmarking Platform (AHG-BP) - ToR in [D-035](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-035.docx), Chair: Markus Wenzel (Fraunhofer HHI, DE)
2. AHG AI for health device security and robustness benchmarking (AHG-AI4HDS) - Co-chairs: Ziyi Yang (CAICT, China) & Kai Fu (China Telecommunications Technology Labs, China)
3. AHG working group methods for online collaborations - Chair: Benjamin Muthambi (Watif Health, South Africa)
4. AHG Data handling and data acceptance policy (AHG-DAH) - Co-Chairs: Benjamin Muthambi (Watif Health, South Africa) & Daidi Zhong (Chongqing University, CN) & Marc Lecoultre (Business Investigation, CH) - to progress the draft revision in [D-033](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-033.docx), draft data submission form and algorithm submission form [NOTE - Assurances will need to be provided in writing from data providers (did not share private data) and model submitters (did not see private data). A form will be prepared for this purpose; an ad hoc group was tasked to draft the two forms.

## Updates for topic groups

The following new topic groups were agreed:

1. TG-Radiotherapy - Radiotherapy [[D-018](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-018.docx)] - Topic driver: Zhenzhou (Joe) WU (BioMind)
2. TG-DiagnosticCT- Volumetric chest computed tomography [[D-024](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-024.docx)] - Topic driver: Kuan CHEN (InferVision)
3. [TG-Growth - Child growth monitoring [[D-013](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-013.docx)] - Topic driver: Yitu Healthcare declined; open position]

It was agreed to merge TG-Autism into TG Neuro-Cognitive Diseases.

The following table lists all Topic Groups active in the FG-AI4H.

| Topic group | References | Leader |
| --- | --- | --- |
| TG-Cardio: Cardiovascular disease risk prediction | FGAI4H-C-017-R1 (WatIF Health & IEPH, South Africa) | Benjamin Muthambi (WatIF Health, South Africa) |
| TG-Cogni: Neuro-cognitive diseases | Alzheimer's: FGAI4H-C-020 UNIL (CHUV (Switzerland),  Autism: FGAI4H-B-018 (Columbia University, USA) | Marc Lecoultre (Business Investigation, Switzerland); Autism: Jongwoo Choi (Columbia Univ., USA) |
| TG-Derma: Dermatology | FGAI4H-C-015 (Fraunhofer Portugal), FGAI4H-C-021 (Xiangya Hosp. Central S. Univ., China) | Maria Vasconcelos (Fraunhofer Portugal) |
| TG-Falls: Falls among the elderly | FGAI4H-C-014 (Fraunhofer Portugal) | Inês Sousa (Fraunhofer Portugal) |
| TG-Histo: Histopathology | FGAI4H-C-018 (Charité Berlin et al.) | Frederick Klauschen (Charite Berlin, Germany) |
| TG-Ophthalmo: Ophthalmology (retinal imaging diagnostics) | FGAI4H-C-026-R1 (Xtend.AI),  FGAI4H-C-022 (Baidu, China) | Arun Shroff (MedIndia, India) |
| TG-Psy: Psychiatry | Paediatric: FGAI4H-C-013 (Zurich Univ. & Charité Berlin) | Nicholas Langer (ETH Zurich, Switzerland) |
| TG-Snake: Snakebite and snake identification | FGAI4H-C-012-R1 (University of Geneva) | Rafael Ruiz de Castañeda (UniGe, Switzerland) |
| TG-Symptom: Symptom assessment | FGAI4H-C-019 (Ada Health), FGAI4H-C-025 (Your.MD) | Henry Hoffmann (Ada Health, Germany) |
| TG-TB: Tuberculosis | FGAI4H-C-023 (ICMR, India; NICF, DoT, India) | Manjula Singh (ICMR, India) |
| TG-Radiotherapy: Radiotherapy | FGAI4H-D-018 (BioMind, China) | Zhenzhou (Joe) WU (BioMind, China) |
| TG-DiagnosticCT: Volumetric chest computed tomography | FGAI4H-D-024 (InferVision, China) | Kuan CHEN (InferVision, China) |
| TG-Growth: Child growth monitoring | FGAI4H-D-013 (Yitu Healthcare, China) | Open position |

The chairman of the WG Operation Chair Markus Wenzel (Fraunhofer HHI, Germany) agreed to follow up with onboarding of the new TG drivers.

The meeting noted that Baidu agreed to join Ada in the TG- Symptom.

Improvements were identified for the calls for participation in various topic groups, see §5.3.

# Promotion and outreach

## Planned promotional activities

None.

## Press communication

* Shan to provide links for the coverage of the FG AI4H meeting in China
* ITU to issue news release on the outcomes of Meeting D and the expected next steps for Meeting E.

# Schedule of future FG meetings, workshops and interim activities

The schedule of future FG meetings, workshops is found in [D-003-R1](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-003-R1):

| Meeting | Date | Venue | Notes |
| --- | --- | --- | --- |
| D | 2-5 April 2019 | Shanghai, China | Hosted by CAICT |
| E | 29 May (Wednesday) – 1 June 2019 (Saturday) | Geneva, Switzerland | Overlapping with AI for Good Global Summit (28‑31 May 2019) |
| F | 2-5 September | Zanzibar, Tanzania | Hosted by Tanzania Communications Regulatory Authority |
| G | November 2019 | New Delhi, India | Hosted by NICF, DoT & ICMR |
| H | January 2020 | Brasilia, Brazil | Hosted by PAHO |

# Closing

The meeting was concluded around noon local time Shanghai.

The Chair thanked Mr Marcel Salathé (EPFL) who stepped down as vice-chair at this meeting for his for his significant contribution to the FG-AI4H work, and looks forward to continue working together in other capacities.

The Chair and group thanked the host CAICT and in particular VC Shan XU for organising an outstanding meeting, as well as the meeting participants, contributors, group leaders and secretariat.

Annex A:  
Agenda

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | | **Related Documents** |
| 1 | Opening | |  |
| 2 | Approval of agenda | | [D-001](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001.docx) (Agenda; Chair); Annex **Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**C |
| 3 | Allocation of documents | | [D-001](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001.docx) (Agenda; Chair);  Annex [B](#AnnexB) (Documentation) |
| 4 | IPR | | Annex [A](#AnnexA) |
| 5 | Management matters | | a) Working Groups |
| 6 | Report on Meeting C; other updates | | a) [C-101](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-C-101.docx) (Report Meeting C; FG-AI4H)  b) [D-004](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-004.docx) (FG-AI4H Progress Report presented to SG16)  c) Reports from ad-hoc groups  d) Reports from Topic Areas ([D-005](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-005.docx)) |
| 7 | Outcome of the workshop | | [D-002](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-002.docx) (Workshop Summary; Chair) |
| 8 | Update on projects, discussion of contributions | |  |
|  | a | Data handling policy | [D-033](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-033.docx) |
|  | b | Thematic classification | - |
|  | c | Status reports | [D-016](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-016.docx), [D-028](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-028.docx), [D-029](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-029.docx), [D-030](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-030.docx), [D-031](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-031.docx), [D-032](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-032.docx), [D-040](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-040.docx), [D-041](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-041.docx), [D-042](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-042.docx), [D-043](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-043.docx) |
|  | d | Use cases | [D-012](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-012.docx), [D-013](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-013.docx), [D-014](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-014.docx), [D-015](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-015.docx), [D-017](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-017.docx), [D-18](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-018.docx), [D-019](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-019.docx), [D-020](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-020.docx), [D-024](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-024.docx), [D-025](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-025.docx) |
|  | e | Other proposals | [D-011](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-011.docx) (AIcrowd benchmarking system), [D-026](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-026.docx) (Policy considerations), [D-027](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-027.docx) (ITU-T Introduction), [D-035](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-035.docx) (ToRs, AHG Benchmarking) |
| 9 | Review of previous output documents | | [D-021-R1](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-021-R1.docx) (modifications to [C-103](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-C-103.docx)), [D-022](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-022.docx) (modifications to [C-105](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-C-105.docx)), [D-034](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-034.docx) (revised call for proposals), |
| 10 | Future work | |  |
|  | a | Work plan and timeline |  |
|  | b | Call for submissions |  |
| 11 | Administrative matters | |  |
|  | a | Schedule of future FG meetings and workshops | [D-003](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-003.docx) |
|  | b | Promotional activities |  |
|  | c | Press communication |  |
| 12 | Outcomes of this meeting | | a) Ad-hoc groups  b) Editing period documents |
| 13 | A.O.B. | |  |
| 14 | Closing | |  |

Annex B:  
Documentation

| Name | Title | Source | Note |
| --- | --- | --- | --- |
| [FGAI4H-D-001](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001.docx) ([Rev.1](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-001-R1.docx)) | Agenda of the fourth meeting ("Meeting D") of the Focus Group on Artificial Intelligence for Health (FG-AI4H) | Chairman FG-AI4H |  |
| [FGAI4H-D-002](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-002.docx) | Summary slides – 4th ITU-WHO Workshop on Artificial Intelligence for Health | TSB |  |
| [FGAI4H-D-003](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-003.docx) | Schedule of future FG meetings (as of 2019-04-01) | Chairman FG-AI4H |  |
| [FGAI4H-D-004](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-004.docx) | FG-AI4H Progress Report to SG16 (July 2018 to March 2019) | Chairman FG-AI4H |  |
| [FGAI4H-D-005](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-005.zip) [(Rev.1)](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-005-R1.zip) | Topic Group Calls for Participation | TSB |  |
| [FGAI4H-D-006](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-006.docx) | Draft ToR for the Working Group "Regulatory considerations on AI for health" | Chairman FG-AI4H |  |
| [FGAI4H-D-007](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-007.docx) | Overview Focus Group Artificial Intelligence for Health | Chairman FG-AI4H |  |
| [FGAI4H-D-011](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-011.docx) | Proposal of open-source benchmarking software: AIcrowd | AIcrowd |  |
| [FGAI4H-D-012](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-012.docx) | Automatic Generation of Diagnostic Reports for PA Chest disease on Pneumothorax, Pleural Effusion, and Rib Fractures | Wingspan Healthcare Group |  |
| [FGAI4H-D-013](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-013.docx) | Intelligent Diagnosis System for Children’s Growth and Development Based on Deep Learning Technology | Yitu Healthcare |  |
| [FGAI4H-D-014](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-014.docx) | AI based Quality Control in Stroke Treatment Service | Huimei Cloud Technology Co.Ltd |  |
| [FGAI4H-D-015](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-015.docx) | AI-Based Mining and Testing Tool for Smart Health Device Vulnerability | CAICT (China) |  |
| [FGAI4H-D-016](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-016.docx) | Standardized Benchmarking for AI-based symptom assessment. | TG-Symptom Topic Driver |  |
| [FGAI4H-D-017](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-017.docx) | Wearable Health Devices | National Institute of Metrology (China) |  |
| [FGAI4H-D-018](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-018.docx) | Automated Generation of Radiotherapy Treatment Plans using Reinforcement Learning | BioMind |  |
| [FGAI4H-D-019](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-019.docx) | Suggestions on data quality evaluation of AI for health | National Institute of Metrology (China) |  |
| [FGAI4H-D-020](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-020.docx) | Proposal: Applying AI to Provide Clinical Decision Support | Baidu | Late |
| [FGAI4H-D-021-R1](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-021-R1.docx) | Proposal to add new contents into FGAI4H-C-103: FG-AI4H Data handling and data acceptance | Chongqing University | Late |
| [FGAI4H-D-022](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-022.docx) | Proposal to change the structure of FG-AI4H-C-105: TDD template | Chongqing University | Late |
| [FGAI4H-D-023](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-023.docx) | Proposed Terms of References for Prospective WG Public and Global Health Considerations | Fraunhofer HHI | Late |
| [FGAI4H-D-024](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-024.docx) | Proposal of an AI Quality Control system: InferRead CT Chest | Infervision | Late |
| [FGAI4H-D-025](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-025.docx) | Proposal of an artificial intelligence research platform: InferScholar Center | Infervision | Late |
| [FGAI4H-D-026](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-026.zip) | Policy Principles for AI in Health – Global Health AI Strategy | Connected Health Initiative |  |
| [FGAI4H-D-027](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-027.docx) | Join ITU-T Standardization Activity | Secretariat of ITU Working Committee of MIIT |  |
| [FGAI4H-D-028](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-028.docx) | Prediction of Psychiatric Multimorbidity in a Large Pediatric Sample | TG Psy Driver | Late |
| [FGAI4H-D-029](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-029.docx) | TG Snake update | TG Snake Driver | Late |
| [FGAI4H-D-030](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-030.docx) | TG TB update | TG TB Driver | Late |
| [FGAI4H-D-031](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-031.docx) | TG Cardio update | TG Cardio Driver | Late |
| [FGAI4H-D-032](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-032.docx) | TG Cogni update | TG Cogni Driver | Late |
| [FGAI4H-D-033](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-033.docx) | Draft Revised "Data handling and data acceptance policy" | TSB |  |
| [FGAI4H-D-034](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-034.docx) | Draft revised Call for Proposals: use cases, benchmarking, and data | Chair WG-Operations |  |
| [FGAI4H-D-035](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-035.docx) | Draft ToR – AHG on a benchmarking platform | Chair WG-Operations |  |
| [FGAI4H-D-036](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-036.pdf) | TG Derma | TG Derma Driver | Late |
| [FGAI4H-D-037](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-037.docx) | Meeting notes: Standardized benchmarking of AI to prevent falls among the elderly | TG-Falls | Late |
| [FGAI4H-D-038](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-038.docx) | Standardized benchmarking of AI for Ophthalmology (Retinal Imaging Diagnostics) | TG-Ophthalmo | Late |
| [FGAI4H-D-039](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-039.docx) | Aspects of Evaluation Procedures for Machine Learning Algorithms | Fraunhofer HHI | Late |
| [FGAI4H-D-040](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-040.docx) | Baidu Ophthalmology update | Baidu | Late |
| [FGAI4H-D-041](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-041.docx) | TG Symptom update | TG Symptom | Late |
| [FGAI4H-D-042](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-042.docx) | TG TB update | TG TB | Late |
| [FGAI4H-D-043](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-043.docx) | TG Ophthalmo update | TG Ophthalmo Driver | Late |
| [FGAI4H-D-044](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-044.pdf) | TG-Histo update | TG-Histo Driver | Late |
| [FGAI4H-D-101](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-101.docx) | Report of the fourth meeting ("Meeting D") of the Focus Group on Artificial Intelligence for Health (FG-AI4H) | FG-AI4H |  |
| [FGAI4H-D-102](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-102.docx) | Updated Call for Proposals: use cases, benchmarking, and data | FG-AI4H |  |
| [FGAI4H-D-103](https://extranet.itu.int/sites/itu-t/focusgroups/ai4h/docs/FGAI4H-D-103.docx) | Updated FG-AI4H data acceptance and handling policy | FG-AI4H |  |

Annex C:  
List participants

The list below identifies 61 participants. Participants of other parallel events have joined the workshop and some of the sessions without registration.

| Title | First name | Last name | Organization | Country | 2 April | 3 April | 4 April | 5 April |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mr | Paolo | ALCINI | European Medicines Agency | E.U. | Remote | Remote |  |  |
| Mr | Pradeep | BALACHANDRAN | Consultant | India | Remote | Remote | Remote | Remote |
| Mr | Yao | BIN | Synyi | China | Remote |  |  |  |
| Ms | Shih-Fang | CHANG |  |  |  | Remote | Remote |  |
| Mr | Ibou | DIOUF |  |  | Remote |  |  |  |
| Mr | Siwei | DAI | Shanghai Senyi Medical Technology | China |  |  |  |  |
| Mr | Simao | DE CAMPOS NETO | ITU |  |  |  |  |  |
| Mr | David | DE MENA GARCÍA | Colegio Oficial de Ingenieros de Telecomunicación (COIT) | Spain |  |  |  |  |
| Mr | Xiang | DING | National Institute of Metrology | China |  |  |  |  |
| Mr | Wang | DONGHUI | Huawei | China |  |  |  |  |
| Mr | Andrew | DURSO | University of Geneva | Switzerland | Remote | Remote |  |  |
| Mr | M. Khair | ELZARRAD | Office of Medical Policy (CDER) | USA | Remote |  |  |  |
| Mr | Yan | GUAN | CAMDI | China |  |  |  |  |
| Mr | Musa | HAUWA ABDULLAHI | Airtel Telecommunication Limited | India |  |  |  |  |
| Mr | Stefan | HAUFE | TU Berlin | Germany | Remote |  |  |  |
| Mr | Henry | HOFFMANN | Ada Health GmbH | Germany |  |  |  |  |
| Mr | Christophe | HSU | Global Dermatology | Switzerland | Remote |  |  |  |
| Ms | Aisha | ISIYAKU | Airtel Telecommunication Limited | India |  |  |  |  |
| Mr | Ferath | KHERIF | University of Lausanne | Switzerland | Remote | Remote | Remote |  |
| Mr | Frederick | KLAUSCHEN | Charité – Universitätsmedizin Berlin | Germany |  | Remote |  |  |
| Mr | Andreas | KÜHN | Ada Health GmbH | Germany |  |  |  |  |
| Mr | Hongzhi | LAN |  | China |  | Remote |  |  |
| Mr | Nicolas | LANGER | University of Zurich | Switzerland |  | Remote |  |  |
| Mr | Marc | LECOULTRE | Business Investigation | Switzerland |  |  |  |  |
| Mr | Yu-Chuan | LI | Alhambra Medical Center | USA |  |  |  |  |
| Mr | Zhaoji | LIN | ZTE Corporation | China |  |  |  |  |
| Ms | Huiqin | LIU | Huimei Cloud Technology Co,.Ltd. | China |  |  |  |  |
| Mr | Jackie | MA | Fraunhofer-HHI | Germany |  |  |  |  |
| Mr | Singh | MANJULA | Ministry of Communications | India |  |  |  |  |
| Mr | Max | MA |  |  | Remote |  |  |  |
| Mr | Sharada | MOHANTY | AICrowd | Switzerland |  | Remote |  |  |
| Mr | Benjamin | MUTHAMBI | WatIF Health, IEPH (Institute of Epidemiology & Public Health) (Consultant to Watif Health) | USA |  |  |  |  |
| Mr | Joel | MYHRE | Consultant | USA | Remote |  |  |  |
| Mr | Mohamed | NOUR | World Health Organization |  | Remote |  |  |  |
| Mr | Bastiaan | QUAST | ITU |  |  |  |  |  |
| Mr | Vishnu | RAM OMANAKUTTY NAIR | Independent Research Consultant | India | Remote |  |  |  |
| Mr | Mario | RAVIC | Ericsson Nikola Tesla d.d | Croatia | Remote |  |  |  |
| Mr | Liyuan | REN | Chongqing University | China |  |  |  |  |
| Ms | Ana | RIVIERE CINNAMOND | World Health Organization | USA | Remote | Remote |  |  |
| Mr | Rajeev | ROY | Indian Council Of Medical Research | India |  |  |  |  |
| Mr | Marcel | SALATHÉ | EPFL | Switzerland | Remote | Remote |  |  |
| Mr | Reinhard | SCHOLL | ITU | Switzerland | Remote | Remote |  |  |
| Mr | Arun | SHROFF | Medindia | India | Remote | Remote | Remote | Remote |
| Mr | Nao | SIPULA | Watif Health IIC | South Africa |  |  |  |  |
| Mr | Foti | SOFIADELLIS | Guy's and St Thomas'​ NHS Foundation Trust | United Kingdom |  | Remote |  |  |
| Ms | Ines | SOUSA | Fraunhofer Portugal | Portugal |  |  | Remote |  |
| Ms | Xiaoying | SUO | Spanish Association for Standardization | Spain |  |  |  |  |
| Mr | Steffen | TENGESDAL | BAO Systems | USA |  |  |  |  |
| Mr | Kim | WEBBER | Health Strategy Consulting | Australia |  |  |  |  |
| Ms | Jiang | WEI | China Mobile | China |  |  |  |  |
| Ms | Lin | WEI | Shanghai Jiaotong University | China |  |  |  |  |
| Mr | Markus | WENZEL | Fraunhofer-HHI | Germany |  |  |  |  |
| Mr | Thomas | WIEGAND | Fraunhofer-HHI | Germany |  |  |  |  |
| Mr | Xiaoyan | XING | Chongqing University | China |  |  |  |  |
| Mr | Jidong | XU | ZTE Corporation | China |  |  |  |  |
| Ms | Shan | XU | MIIT | China |  |  |  |  |
| Mr | Yaro | YAKUBU MOHAMMAD | Airtel Telecommunication Limited | India |  |  |  |  |
| Ms | Yuan | ZHANG | China Telecommunications | China |  |  |  | X |
| Mr | Daidi | ZHONG | Chongqing University | China |  |  |  |  |
| Mr | Damien | ZUFFEREY | BAO Systems | USA | Remote |  |  |  |
| Mr | Rafael | RUIS | UNIGE | Switzerland | Remote | Remote | Remote |  |

Annex D:  
ToR for the WG on regulatory considerations on AI for health

D.1 Proposed structure

The diagram in Figure D.1 illustrates the proposed structure of the Working Group "Regulatory considerations on AI for health" (WG-RC).

The WG has one chair nominated by the Focus Group. ITU or WHO members can each nominate a vice-chair from their regulatory bodies. Vice-chair nominations are confirmed either at Focus Group meetings or by the FG management in-between meetings.

Regulatory bodies are meant here to include national and regional organizations that have in their mandate the responsibility for assessing the safety and efficacy of AI for health technologies within their jurisdictions.

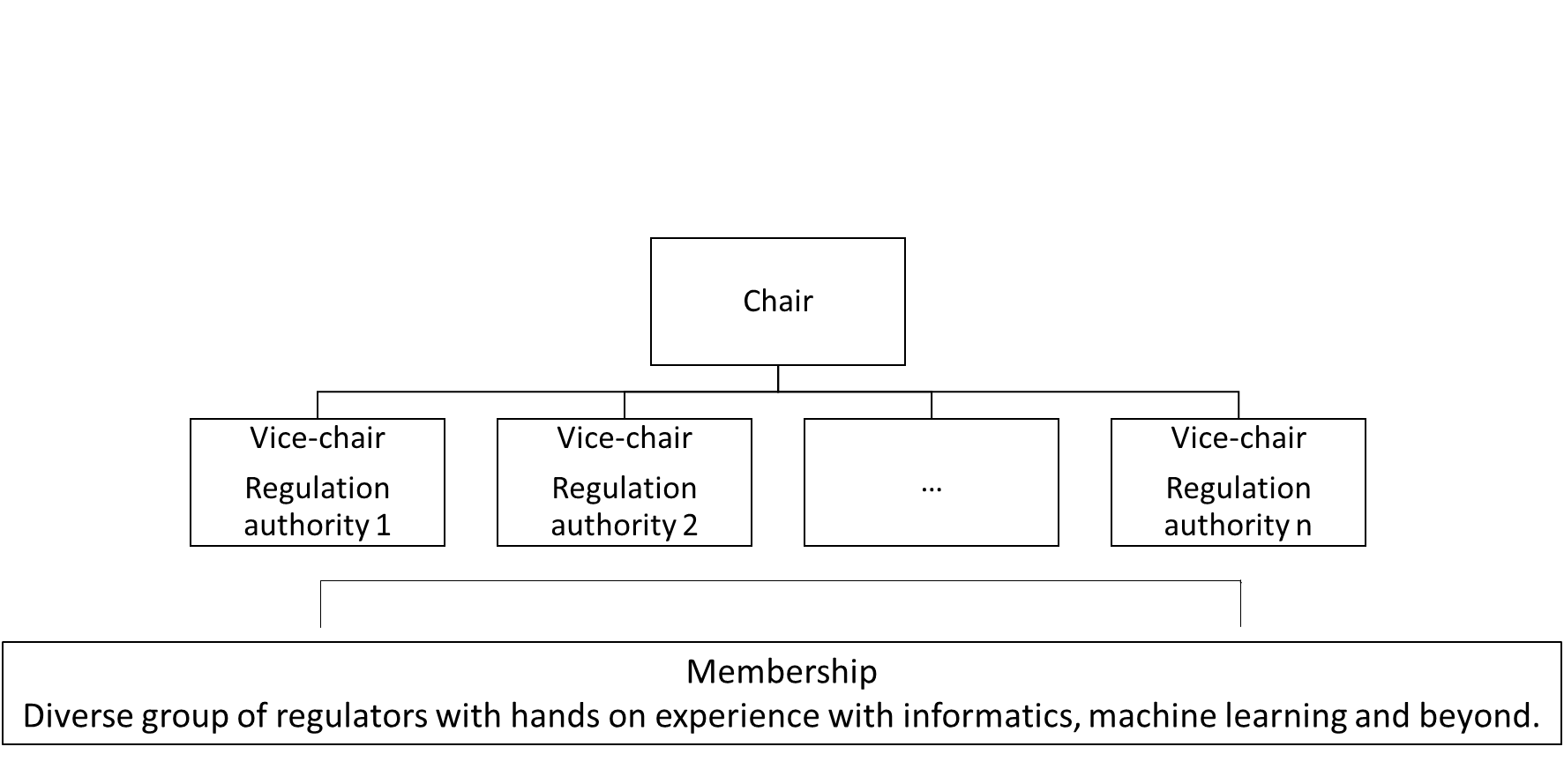


Figure D.1 – Illustration of the WG-RC structure

D.2 Scope and description

The working group "Regulatory Considerations for AI" will help guide the FG in navigating the regulatory landscape; facilitating contacts, information exchange, and collaborative opportunities of the FG with regulatory bodies. The working group will help outline key regulatory considerations that are relevant to regulatory agencies for AI development. The working group will also help define ways to successfully benchmark AI for health algorithms.

Specific issues to be addressed include:

* How can the FG work together with regulatory bodies to ensure that the procedures, benchmarks, and validation principles are useful and relevant for regulators and other stakeholders? This will further facilitate a wider adoption of AI in the health.

Tasks include, but are not limited to:

* Organize networking opportunities to facilitate information and knowledge exchange between experts, regulators, and different stakeholders
* Identify regulatory challenges and opportunities
* Develop an outline of shared key considerations to consider for the regulation of AI in health

D.3 Deliverables and timeframe

The working group is to deliver the following:

* In close collaboration with the WHO, the working group will develop appropriate key regulatory considerations document that will serve as consensus elements to establish policies and regulations that ensure the safe and appropriate development and adoption and use of AI in health. (Expected timeframe: initial draft by the summer of 2019. Finalize by the end of 2019).
* Outline of opportunities and challenges for the development and adoption of AI in Health and will propose demonstration projects and workshops to help further the understanding of all stakeholders. (Expected timeframe: By the end of 2019 for documentation. TBD for demonstration projects).

D.4 Representations and interactions

* Chairs and experts of the other working groups of FG-AI4H
* ITU secretariat and WHO representatives
* Invite WG members from different regulatory agencies with relevant expertise.
* Workshops to include participants from different stakeholders (academic institutions, industry (biotech, pharma, informatics, etc.), regulatory agencies, bioethics, patient advocacy groups and other stakeholders).

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