

Activities of Correspondence Group on Artificial Intelligence of Things in ITU-T SG20

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24 August 2022



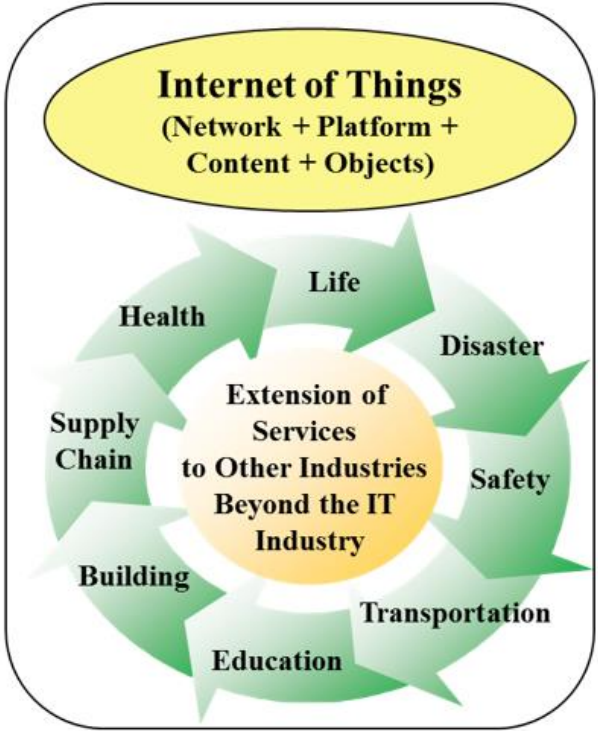
Introduction

- **Data**
 - From data to actionable knowledge for creating value
- **Connected Intelligence**
 - From Cloud Native to AI Native
 - Decentralized intelligence
- **Fully automated Infrastructure**
 - AI for networks and Networks for AI



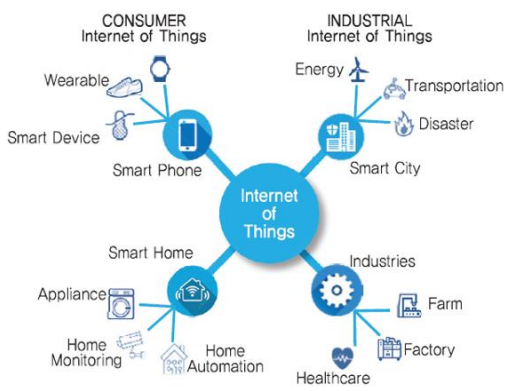
Technology Evolution for IoT

IoT and Data – Artificial Intelligence of Things (AIoT)

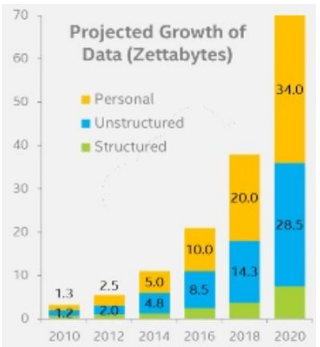


Interdisciplinary Approach

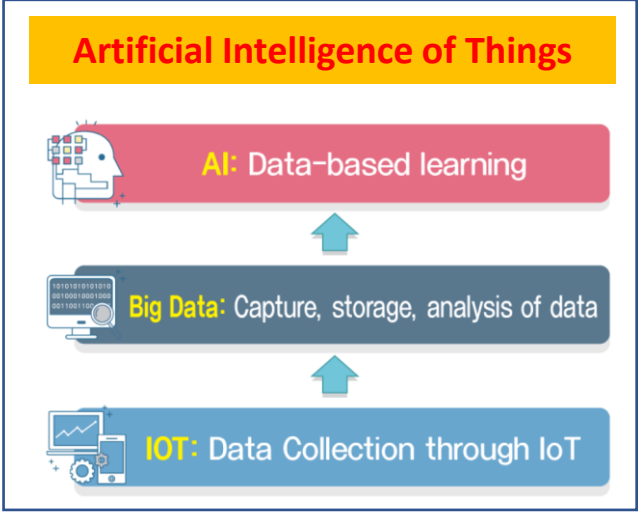
Extension of IoT Applications



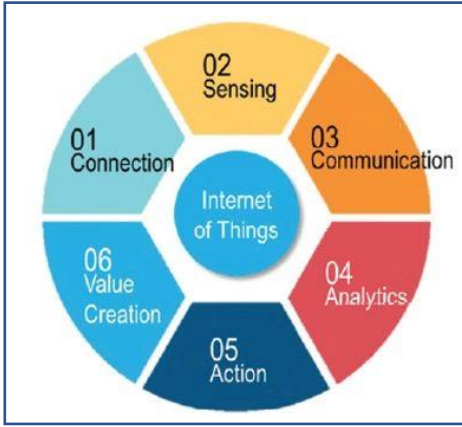
Data Explosion



Leverage **the massive amount of data**

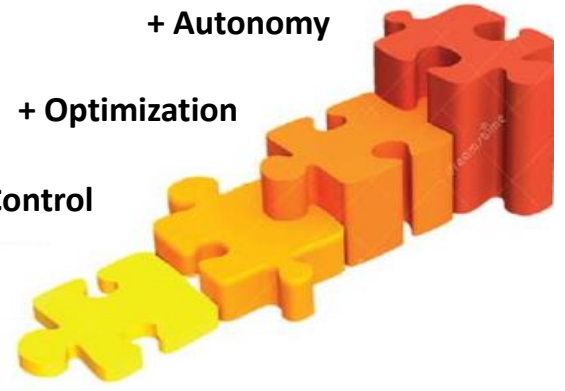


From Connecting Devices to **Creating Value**



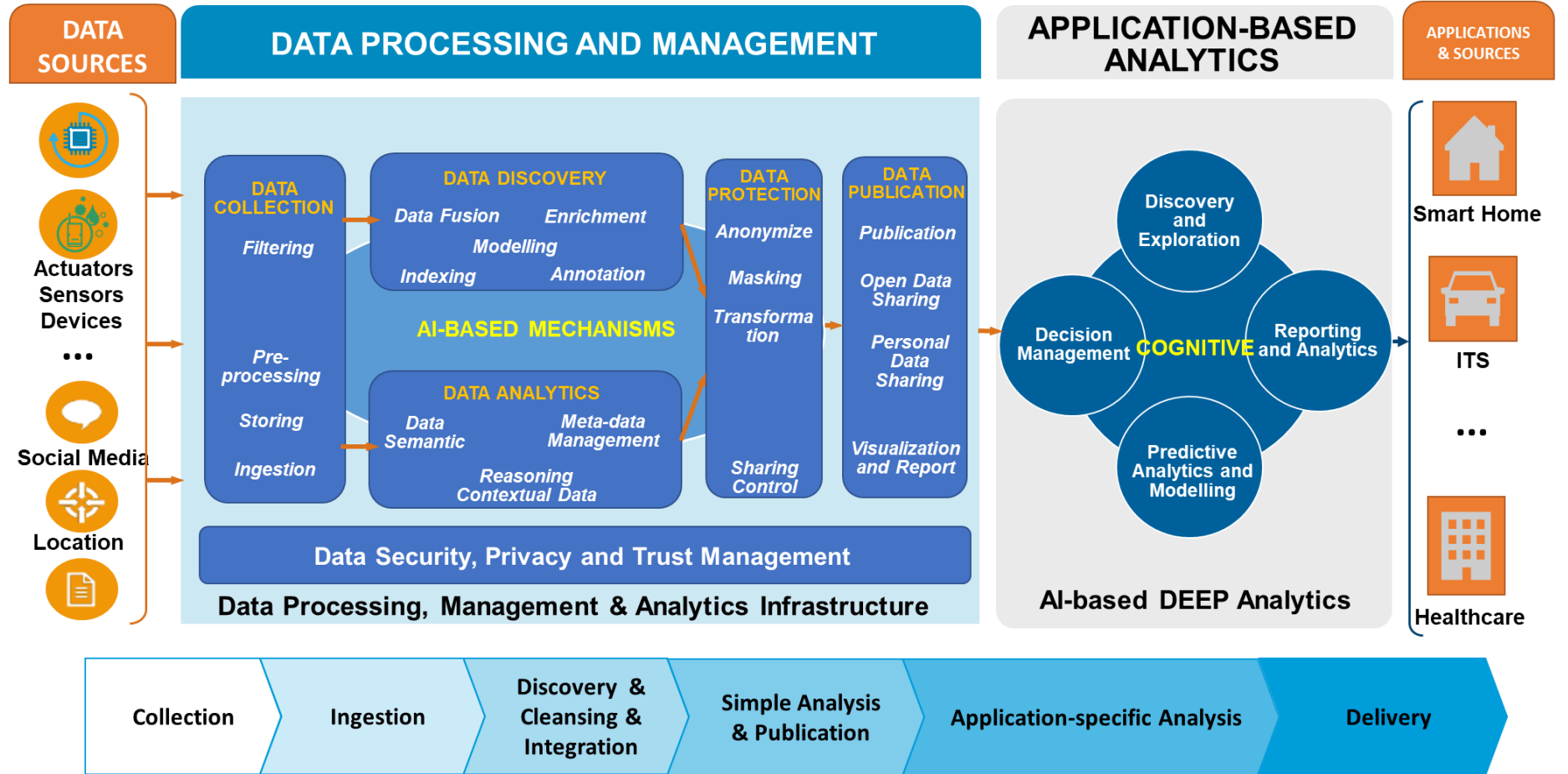
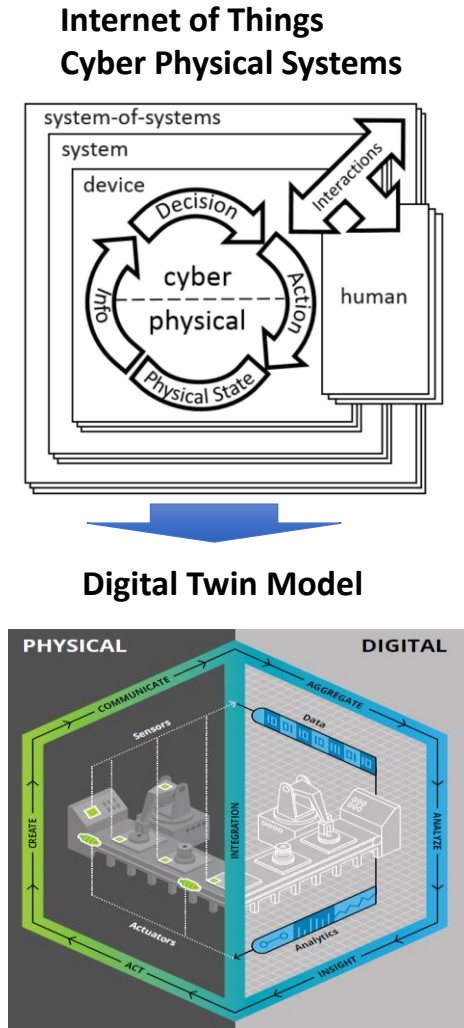
Identification/Sensing

+ Remote Control
+ Optimization
+ Autonomy



Data-driven AIoT

Gyu Myoung Lee, et. al., "Digital twin in the IoT context: a survey on technical features, scenarios and architectural models," *Proceedings of the IEEE*, ISSN 0018-9219, 40 pages, June 2020.



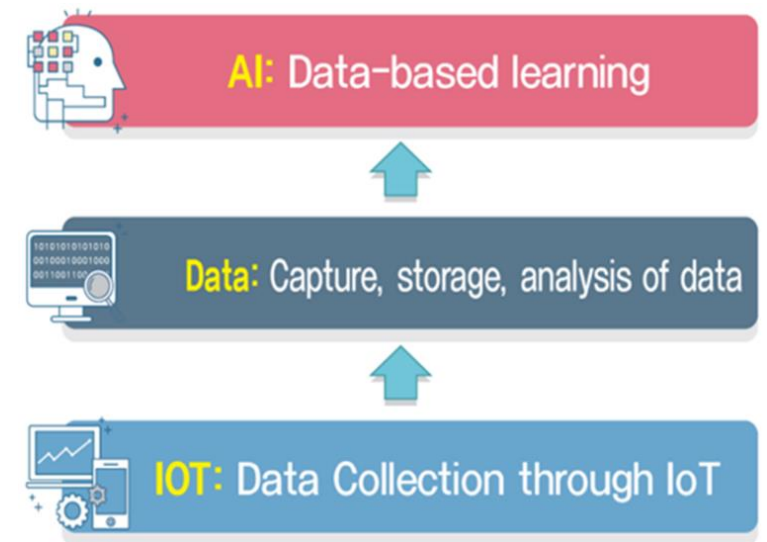
Data Security, Privacy, Trust and Governance for trustworthiness in AIoT

Trustworthiness encompasses the concerns of **security, privacy, safety, reliability and resilience**, which are too often addressed separately and in isolation in risk management approaches. (NIST CPS Framework)

SG20 meeting – October 2021 (C-978)

- Request to initiate a series of activities on Artificial Intelligence of Things (AIoT) standardization
 - propose to start a series of activities for preliminary efforts on AIoT standardization

Artificial Intelligence of Things (AIoT), a combination of AI, data and IoT, creates intelligent things that learn from the generated data and use these insights to make autonomous decisions with distributed and lightweight AI technologies to enable intelligence on the edge as well as to achieve more efficient and real-time IoT operations, improve human-machine interactions and enhance data management and analytics.



SG20 meeting – October 2021 (C-979)

- Proposal to develop a Technical Paper on Artificial Intelligence of Things (AIoT)
 - propose to develop a Technical Paper on AIoT, as one of a series of activities, to stimulate AIoT related standardization in the future.
 - The Technical Paper aims to provide technical insight and a clear direction for AI powered IoT standardization in ITU-T SG20.

1.	Introduction
2.	Review of existing standardization efforts on AI and IoT
3.	AIoT: Combining AI and IoT
3.1.	Concepts.....
3.2.	Technical features
3.3.	User-centric approaches.....
4.	Conceptual Model of AIoT
5.	Challenges for standardization on AIoT
5.1.	Considerations for standardization
5.2.	Standardization landscape for AIoT
5.3.	Potential work items
6.	Conclusion
	Appendix I – Comprehensive review of existing standardization efforts on AI and IoT
	1.1 ITU-T standardization activities related on AI and IoT
	1.2 ISO/IEC JTC1/SC42 standardization activities related on AI and IoT
	References

Technical Features and challenges (C-979)

Technical features

- AI at the edge
- Lightweight AI/ML (TinyML)
- Distributed Artificial Intelligence-as-a-Service (DAIaaS)
- Decentralization with blockchain
- Predictive Analytics and Real Time Processing with Accurate Decision

User-centric approaches

Challenges for standardization

- Complexity
- Heterogeneity
- Security, privacy, and trust
- Accuracy and speed
- Legal compliance

Gap analysis (C-979)

- Comprehensive review of existing standardization efforts on AI and IoT
 - ITU-T standardization activities related on AI and IoT
 - ITU-T is targeting the adoption of AI in specific application domains such as health, autonomous and assisted driving, etc., rather than considering AI itself.
 - ISO/IEC JTC1/SC42 standardization activities related on AI and IoT
 - ISO/IEC JTC1/SC42 is developing core standards for general aspects on AI.

Establishment of CG-AIoT (TD2458)



INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION
STANDARDIZATION SECTOR**

STUDY PERIOD 2017-2020

SG20-TD2458

STUDY GROUP 20

Original: English

Question(s): 4/20

Virtual, 11-21 October 2021

TD

Source: Rapporteur Q4/20

Title: Proposal for a series of activities on Artificial Intelligence of Things (AIoT) standardization

Purpose: Admin

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Korea (Rep. of)

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Terms of Reference of the Correspondence Group for AIoT Activities (CG-AIoT)

1. A series of activities will be carried out to provide guidelines for future AIoT standardization in a timely and strategic way in SG20. The following tasks may include:
 - a) Study AIoT technologies and analyze technical features from a standardization perspective;
 - b) Conduct a gap analysis of existing standardization efforts on AI and IoT;
 - c) Identify a clear direction for AIoT standardization and potential work items;
 - d) Organize webinars/workshops on AIoT with external experts if necessary.
2. Develop a Technical Paper containing technical insight and a clear direction for AI powered IoT standardization to stimulate AIoT related standardization in SG20.
3. The AIoT activities will be reported to SG20 meetings regularly.
4. When AIoT activities are finalized, the report of the CG-AIoT will be submitted to the SG20 meeting, along with the Technical Paper containing technical insight and a clear direction for AI powered IoT standardization.
5. The AIoT activities will use the email list cg-aiot@lists.itu.int (TBD). The AIoT activities may include electronic meetings and/or face-to-face meetings (possibly co-located with SG20 meetings or other meetings on AIoT).

NOTE: SG20 colleagues interested in AIoT activities will be invited to subscribe to the mailing list.
6. The Convenor for AIoT activities will be Mr. Gyu Myoung Lee (gyumyoung.lee@gmail.com).
7. The lifetime of AIoT activities will be from January 2022 to December 2022 (one year), but extensible, if necessary, by decision of the SG20.

Kick off meeting (TD18)

- At the kick off meeting of CG-AIoT on **19 January 2022**, an initial version of a Technical Paper on AIoT was made, based on the input contribution (**C-106**). After clarifying the scope of this paper, the meeting has requested to invite related contributions for the following points:
 - Review of existing activities of other SDOs such as IETF (e.g., Thing-to-Thing (t2t) research group) and oneM2M, etc.;
 - Define the term – AIoT;
 - Inputs for AIoT use cases, a framework, technologies and gap analysis, etc.
- The meeting has also invited editors to develop this Technical Paper.
- In addition, the meeting has requested to organize a webinar for promoting the activities and invite experts from ITU-T and other SDOs as well as SMEs and related stakeholders as speakers, in conjunction with the next Q4/20 interim and CG-AIT meeting held in 13-15 April 2022. After consultation with TSB, the detailed information will be announced if the webinar is confirmed.
- **TD17**: An initial version of a Technical Paper on Artificial Intelligence of Things (AIoT)

2nd CG-AIoT meeting (TD50)

- Reviewed three input contributions on **13 April 2022**
 - C11: Discussion to make progress of a Technical Paper on Artificial Intelligence of Things (AIoT)
 - C12: Updates for clauses 3 of Technical Paper on Artificial Intelligence of Things (AIoT)
 - C13: Updates for clauses 4-6 of Technical Paper on Artificial Intelligence of Things (AIoT)
- Based on the three input contributions (C-11, C-12 and C-13), all proposals were incorporated with some editorial updates and editor's notes.
- **TD49**: Draft output text for Technical Paper "Artificial Intelligence of Things" (e-meeting, 13 - 15 April 2022)

3rd CG-AIoT meeting (TD171)

- Reviewed three input contributions on **10 June 2022**
 - C14: Proposal of A.13 justification to initiate the new work item to develop a Technical Paper on Artificial Intelligence of Things (AIoT)
 - C15: Proposal for AIoT
 - C16: Proposal for a scenario of AIoT: smart home
- From C-14, the meeting has made an updated A.13 justification and suggested to submit it for the July SG20 meeting for approval.
- Based on the two input contributions (C-15 and C-16), all proposals were incorporated with some editorial updates. From C-15, sections 3 and 7 are updated. From C-16, a new Appendix on a scenario of AIoT: smart home is added.
- **TD172:** Draft output text for Technical Paper "Challenges of and Guidelines to Standardization on Artificial Intelligence of Things (AIoT)" (e-meeting, 10 June 2022)

SG20 meeting (July 2022)

- Goals of this meeting
 - To introduce CG-AIoT activities at the briefing session (13:30-14:00)
 - To review A.13 justification for initiating the new work item on AIoT Technical Paper;
 - To progress the work on AIoT Technical Paper (review of input contributions);

1) AIoT Technical Paper:

- Output text for proposed draft new Technical Paper ITU-T YSTP.AIoT "Challenges of and Guidelines to Standardization on Artificial Intelligence of Things" ([TD347](#))
- A.13 justification for proposed draft new Technical Paper ITU-T YSTP.AIoT "Challenges of and Guidelines to Standardization on Artificial Intelligence of Things" ([TD346](#))

2) Meeting report:

- CG-AIoT meeting report ([TD380](#))

ITU-T YSTP.AIoT

- Title: "Challenges of and Guidelines to Standardization on Artificial Intelligence of Things"
 - Data driven IoT applications are becoming significantly more important to leverage the massive amounts of data from devices with the emergence of data and AI technology.
 - As a combination of AI, data and IoT, Artificial Intelligence of Things (AIoT) focuses on intelligent things and their applications that learn from the generated data and use these insights to make autonomous decisions.
 - This Technical Paper intends to provide guidelines for AIoT standardization from an ITU-T SG20 perspective as a key outcome of CG-AIoT activities.

Three key items

- concepts and features of AIoT in the views of technical trends and standardization
- gap analysis of related standardization efforts
- identification of challenges and guidelines for future standardization

FG-AI4A

Focus Group on "Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture" (FG-AI4A)

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Focus Group on Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture

Focus Group on AI for Natural Disaster Management

Focus Group on AI for autonomous and assisted driving

Focus Group on Quantum Information Technology for Networks

Focus Group on Environmental Efficiency for Artificial Intelligence and other Emerging Technologies

Focus Group on Artificial Intelligence for Health

Focus Group on Vehicular Multimedia

Concluded Focus Groups

FG-AI4A

By the year 2050, the global population is on track to reach 9.7 billion people.^[1] Some estimates show that to meet such growing food demand, global food production needs to grow by 70% in the next few decades, all while the agriculture sector faces several challenges.^[2] These circumstances highlight the importance of (and challenges related to) achieving zero hunger by 2030. Fortunately, digital technologies can help us to improve the management of agricultural production processes and achieve food security.

To address the core challenges and opportunities within the agricultural sector, the Focus Group on Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture (FG-AI4A), will explore the potential of emerging technologies including AI and IoT in supporting data acquisition and handling, improving modelling from a growing volume of agricultural and geospatial data, and providing effective communication for interventions related to the optimization of agricultural production processes. The Focus Group will also examine key concepts, and relevant gaps in current standardization landscape related to agriculture, and will underscore the best practices and barriers related to the use of AI and IoT-based technologies within this domain.

To achieve these objectives, FG-AI4A will cooperate closely with FAO converging multiple stakeholders and experts from across the globe, serving as an open platform to explore the potential of AI and IoT to support innovative practices for agricultural production processes.

Upcoming Meetings | Focus Groups News | Past Meetings

TBD

HOW TO PARTICIPATE

- ▶ Sign up for your ITU user account
- ▶ Templates: [input docs](#) | [oLS](#) | [output docs](#) | [technical reports](#)
- ▶ Join the mailing-list (fgai4a@lists.itu.int)
- ▶ Sign up with your ITU user account

NOTE: A free ITU Account is required to access relevant documentation and participate

RELATED EVENTS

Coming soon!!

MANAGEMENT AND CONTACTS

Co-Chair(s):

- ▶ Ramy Ahmed Fathy (Egypt)
- ▶ Sebastian Bosse (Fraunhofer HHI, Germany)

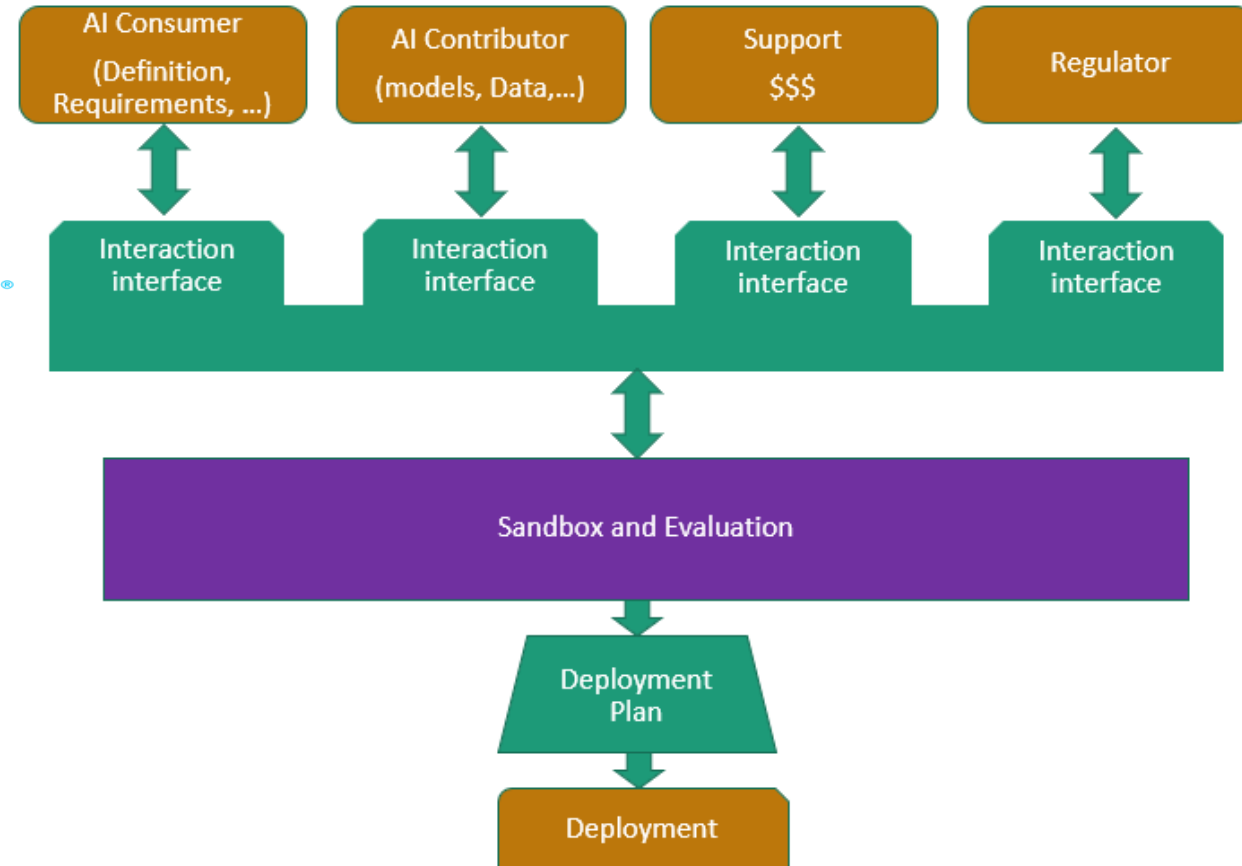
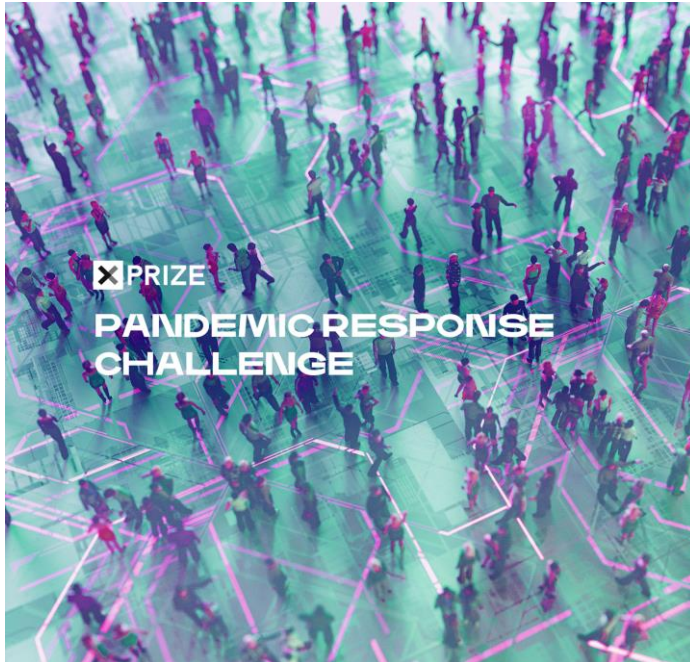
Vice-Chair(s):

- ▶ Chunlin Pang (TIAA, China)
- ▶ Zhongxin Chen (FAO)
- ▶ Gyu Myoung Lee (Korea (Republic of))
- ▶ Paolo Gemma (Huawei Technologies Co., Ltd.)
- ▶ Ted Dunning (Hewlett Packard Enterprise)
- ▶ Sushil Kumar (Department of Telecommunications, Government of India)
- ▶ Guillermo Ariel González Conosciuto (Argentina)
- ▶ Long Hoang (John Deere, United States)
- ▶ Marco Brini (EnvEve, Switzerland)

ITU Contact:

- ▶ Mythili Menon, Advisor
- ▶ Email: tsbfgai4a@itu.int

Project Resilience



- **WG1 (Platform MVP):** Babak Hodjat, Risto Miikkulaninen
- **WG2 (Data Contributions):** Gyu Myoung Lee, Toby Philips
- **WG3 (Product Experience):** Mohanty Sharada, Sean McGregor



Future plan

- Interim activities in conjunction with Q4/20
 - 5 – 7 October 2022 (e-meeting)
 - 14 – 16 December 2022 (e-meeting)
- The editing team of the AIoT Technical Paper will meet regularly to make progress and additional CG-AIoT e-meetings will be arranged.
- Next SG20 meeting
 - 30 January – 10 February 2023 (Geneva)

