Tutorial:
On the Prospect of Academic Contributions to ITU Standardization

Ved P. Kafle, PhD
Senior Researcher
National Institute of Information and Communication Technology (NICT) Tokyo, Japan

Rapporteur
ITU-T Study Group 13
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Self introduction

• Education
  – Schooling: Nepal
  – Bachelor: India (PEC, Chandigarh)
  – Masters: South Korea (SNU, Seoul)
  – PhD: Japan (Sokendai, NII)

• Work
  – Senior Researcher at NICT (since 2006.10)
  – Visiting Associate Professor at UEC (since 2013.4)

• ITU
  – Rapporteur of ITU-T Study Group 13 Question 22
    • Responsible for standardization of upcoming network technologies of IMT-2020/5G
  – Participating in Kaleidoscope since the first conference (2008)
Introduction to my organization

• National Institute of Information and Communications Technology
• A national research institute under MIC（総務省）
• Location/branches:
  – Tokyo (HQ), Yokosuka, Keihanna, Kobe, Sendai, ...
• Number of employees: 1029 (2017.4)
• More:
  – Homepage: http://www.nict.go.jp
NICT research areas

Pioneering future society with cutting-edge ICT

CREATE 創
Data utilization and analytics platform

PROTECT 守
Cybersecurity

CONNECT 繋
Integrated ICT

WATCH 視
Sensing fundamentals

DEVELOP 拓
Frontier research

Promotion of R&D and social implementation of research results through industry-academia-government collaboration
Standards and standardization

• What are standards?
  – Definition from ISO (www.iso.org/standards.html): A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.
  – Definition from IEEE (standards.ieee.org/develop/overview.html): Standards are published documents that establish specifications and procedures designed to maximize the reliability of the materials, products, methods, and/or services people use every day. Standards address a range of issues, including but not limited to various protocols to help maximize product functionality and compatibility, facilitate interoperability and support consumer safety and public health.

• What is standardization?
  – is the process of developing standards by standard develop organizations (SDOs) and implementing by relevant stakeholders.
What are SDOs?

• An SDO is an organization whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting, or otherwise producing technical standards that are intended to address the needs of some relatively wide base of affected adopters. [Wikipedia and reference therein]

• SDOs can be national, regional and international. For example,
  – TTC and ARIB (Japanese national SDOs for telecommunication and wireless communication, respectively)
  – ETSI (European Telecommunication Standards Institute) is regional SDO
  – ISO, ITU, IEC are international SDOs
Why are standards important?

- Simplify product development by establishing consistent protocols that can be universally understood and adopted
- Promote compatibility and interoperability
- Speed up time-to-market
- Help to understand and compare competing products
- Promote international trade, global market competition and price reduction
- Encourage innovation
- Contribute to better governance and regulation
- Provide opportunity to share and enhance existing practice/product
- Increase customer’s confidentiality
Why is education about standardization important?

• “Knowledge of standards can facilitate the transition of students from classroom to professional practice by aligning educational concepts with real-world applications.” [IEEE SA]*

• Engineers either use standards to develop a product or participate in standardization process in SDOs
  – So, engineers need to know how to read standards
  – need to know how to develop standards or about standardization process

International Telecommunication Union (ITU)

- ITU is the United Nations specialized agency for information and communication technologies, located in Geneva.

- ITU’s major functions through three sectors:
  - ITU-R
    - Allocate/managed global radio spectrum and satellite orbits,
  - ITU-T
    - Develop the technical standards that ensure networks and technologies seamlessly interconnect
  - ITU-D
    - Improve access to ICTs to underserved communities worldwide.

- Technical standards are developed through contributions received from members.
ITU-T standardization

- Standardization work is carried out by the Study Groups (SGs) in which representatives of ITU-T membership participate to develop standards (called ITU-T Recommendations) for the various fields of telecommunications.
- There are 11 Study Groups in ITU-T
  - e.g. Study Group 13 – Future Network, Study Group 17 – Security
- In each Study Group, there are several Questions, each writing technical specifications of a specific topic
  - e.g. Study Group 13 has 13 Questions, Question 22 is for writing standards on ICN and upcoming network technologies.
• Each Question may meet many times between SG meetings in form of Rapporteur meetings to review Contributions from the members to initiate or progress draft Recommendations
  – Contributions are the proposal from members

• Once a draft is mature i.e. contains complete text, it’s presented in the Study Group plenary meeting to Consent (AAP) or Determination (TAP).

• In case of AAP, a Consented draft is sent to member states and sector members for Last Call comments (4 weeks). If no comments are received, it is approved and is published as an ITU-T Recommendation.  … (continue on next slide)
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• If comments are received, the draft is revised for an additional review period (3 weeks) and eventually may be approved directly. If further comments are received it is presented in the next plenary meeting.
  – It takes about 1 to 2 years time for completing a Recommendation from its initial proposal.

• In the case of TAP approval, the process is longer as this is used for Recommendations with regulatory or policy implications which need a careful review of Member States.

• Some popular ITU-T Recommendations are E.164, H.263, H.323, X.509, Y.3001, etc.
ITU membership types

- 193 Member States
- 539 Sector Members
  - Sector granularity
- 163 Associates
  - SG granularity
- 125 Academia
  - Can involve in all sectors
  - Can be editor, rapporteur, but not vice/chair of Study Groups; no voting rights

Data source: ITU website access on Nov 7, 2017.
Opportunity for academia

*Bring your ideas on ICTs to life, raise your academic profile and build your career!

1. ITU Journal: ICT Discoveries
2. Kaleidoscope conferences
3. Seminar for students
4. Lecture series
5. Internship program

My involvement with ITU-T standardization

- ITU-T SG13 since 2007
  - As editor of Recommendations on NGN
  - Focus Group on Future Networks
  - Edited 7 Recommendations/ Supplements
  - Rapporteur Q15 (2014-2016), Q22 (2017- )
  - ICN and upcoming technologies for IMT-2020
ITU Kaleidoscopes

- Every year since 2008 (first)
- Many unique features
  - Theme changes every year
  - Held in various countries (four continents so far)
  - Covers important topics on infrastructures, services, policies
  - Best paper awards
  - Opportunity to publish in IEEE Communications (Standards) Magazine and other journals
  - Double-blind peer review
  - Excellent venue for human networking
  - Path leading to standardization
My involvement with ITU Kaleidoscopes (2)

- Participating every year since 2008 (1st)
  - Presenting papers
    - Best paper awardee (second prize) 2009, 2014
    - Best paper nominee 2010, 2016
  - TPC member since 2011 (4th)
  - Session chair since 2011
Related organizations/activities

• World Standards Cooperation (WSC)
  – Established in 2001 by IEC, ISO, ITU
  – To strengthen and advance voluntary consensus-based standards systems
  – Celebrating World Standards Day, October 14
  – www.worldstandardscooperation.org/

• International Cooperation for Education about Standardization (ICES)
  – Established in 2006
  – As a network of individuals and organizations interested in education about standardization, an unregistered non-profit organization
  – Organizes yearly workshops
Conclusion

• Standards are essential for technological innovation, business, policy and governance.

• Standardization work is important and interesting.

• Academia involvement in standardization produces multifaceted benefits.

• ITU Kaleidoscope conference is an excellent venue for both academia and industry.