IEEE Standardization of Emerging Technologies Involving Industrial and academic Researchers

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FDC Technology Standards RoundTable, July 26-2022
Outline

- Technology Evolution Model
- Research-to-Standards Challenge
- Attracting Researchers – The IEEE Ecosystem for Standardization of Emerging Technologies
- Sample Success Stories
IEEE Ecosystem for Research and Standardization

Technology Timeline

0

Conceptual

Pre-competitive

Competitive

Deployment

Core Technology Phases

- Concept is born
- Socialized mostly in a closed Circle of experts
- No convincing proof of concept
- No investment
- Often a “skunk project”
- Strongest Intellectual Property:
  - Highly cited papers
  - Strong patents

- Proof of concept
- No Business Model
- Risk investment
- Academic exercise
- Pet project
- Strong Intellectual Property

- Proven - It works
- Proprietary business models
- Talk of the town
- Academics’ paradise
- Good investment
- Funded project
- A dream-default standard

- Hot stuff
- Race to market
- Rush standards
- Industry forums
- Marketing hype
- Compliance testing
- Analyzing technology
- 20/20 hindsight papers
- Weak Intellectual Property
IEEE Ecosystem for Research and Standardization

**Core Technology Phases**

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- **Pre-competitive Phase**
  - Proof of concept
  - No Business Model
  - Risk investment
  - Academic exercise
  - Pet project
  - Strong Intellectual Property

- **Competitive R&D**
  - Proven - It works
  - Proprietary business models
  - Talk of the town
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- **Deployment**
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  - Race to market
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  - Weak Intellectual Property
IEEE Ecosystem for Research and Standardization

Core Technology Phases

IP (Patents, Papers)
Relevance
IP Strength

Conceptual Phase
Pre-competitive Phase
Competitive R&D
Deployment

100%

IP Strength

IP Relevance

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IP (Patents, Papers)
Relevance
IP Strength

Core Technology Phases

Conceptual Phase
Pre-competitive Phase
Competitive R&D
Deployment

100%
0

IP Strength
IP Relevance

IEEE Workshops
IEEE Conferences
IEEE Publications
Standardization Study Groups
Market Driven Standards
Industry Forums

IEEE Technical Activities
IEEE Standards Activities
IEEE Ecosystem for Research and Standardization

Conceptual Phase
Pre-competitive Phase
Competitive R&D
Deployment

IEEE Workshops
IEEE Conferences
IEEE Publications
IEEE Standardization Study Groups
IEEE Standards Activities
Market Driven IEEE Standards
IEEE Industry Events

IEEE Technical Activities
IEEE Standards Activities

Industry Practitioners
Industrial and Academic Researchers

Researchers
Practitioners

Core Technology Phases

100%
IEEE Ecosystem for Standardization of Emerging technologies

- Emerging Technologies Standards may appear:
  - not necessarily current market-relevant
  - often disruptive
  - However enable new markets and new business models

- One of the major requirements for Emerging Technology standardization is participation of industrial and academic researchers

- Attracting researchers to the standards development process presents a single major challenge globally

- A special ecosystem is required to deploy researchers in discovery of standardization opportunities, orchestrate researchers’ and practitioners’ partnership for development of Emerging Technology standards

- IEEE is best positioned for implementation of this mission
IEEE Standardization Ecosystem for Emerging Technologies

IEEE Societies and Councils

- S/C-based Standards Activities
- IEEE TA M&C
- Industry/Standards Events
- IEEE TA PUBs:
- S/C Standards Awards
- S/C Fellow Elevation Process

Emerging Technologies Standardization

IEEE Standards Association

- IEEE Standards Board
- IEEE SA SESCom
- IEEE SA Industry Connections
- IEEE SA Contributions Collector
- IEEE SA FelCom

Future Directions

- IEEE Public Safety Technology Initiative
- IEEE Future Networks Initiative
- IEEE Green ICT Initiative
- IEEE SDN Initiative
- IEEE Quantum Initiative
- IEEE BlockChain Initiative
- IEEE IoT Initiative
- IEEE SmartGrid Initiative

Industry and Academia Alliances

- GreenTouch Alliance
- PLC Consortia
- CSA (formerly Zigbee)
- ORAN
- Industrial IoT (former OpenFog)
To anticipate and determine the direction of existing, new and emerging technologies, and related issues

To spearhead their investigation and development by IEEE in association with Societies/Councils (S/C’s).

The emphasis is on new, emerging technical areas either not adequately covered by existing (S/C’s), or which overlap the fields of interest of the existing S/C's, taking a collaborative view that would often involve other constituencies.
TAB CoS Role In TA based Standards Activities Governance

- Promote standards activities across Technical Activities (TA)
- Maintain the strategic alignment between Technical Activities and Standards Activities (IEEE SA)
- Fill the governance GAP between TAB and TA-based Standards Activities
- Partner with:
  - Future Directions Committee (FDC)
  - Society/Council Review Committee (SCRC)
  - Other committees under the TAB Management Committee
- TAB CoS Manual (work in progress) is a unique guide for IEEE Technical Societies in structuring and governance of standards development and Standards-related activities for the objective of creating an IEEE ecosystem which is favorable to standardization of emerging technologies
Governance of Standards Development
Incubation projects in entire S/C Field of Interest
New SCs set up, Liaison to IEEE-SASB

Standards Activities Governance
Liaison to IEEE-SA BOG & SMDCs and to TAB CoS

Standards Activities
- Standards Committees
- Incubated WGs
- Study Groups

Standards Related Activities
- Standards Related M&C
- IEEE-SA IC Com
- Standards Related PUBs

Industry Engagement
- RRSA
- FDC Initiatives
- Research Projects
- Standards Methodology
**Rapid Reaction Standardization Activities - RRSA**

- Brings together **industrial and academic researchers and industry practitioners** to brainstorm ideas and proposals for standardization in a specific emerging technology area.

- **Individuals with strictly professed interest are funded** for attendance of the RRSA session.

- **World-wide solicitation** among relevant IEEE Technical Societies and Councils of participation bids with required contributions (position statements, vision, standardization project ideas or specific proposals).

- **Selection** by RRSA hosting team of limited number of participants based on submitted contributions.

- **Possible outcomes from RRSA**: IEEE SA Industry Connections (IC) Research Project, Study Groups, PAR - Project Authorization Request proposals, etc.

- **Possible IC Research Project outcomes**: joint publications, proposals for Special Issue or Feature Topic Issue for IEEE PUBs, event or series of events proposals, Technology Roadmap document, White Paper, Vision document, Study Group proposal, IEEE Standardization Project Proposal (PAR).
ComSoc Rapid Reaction Standardization Activity - RRSA

Research Project – IEEE SA Industry Connections (IC) Project
Scope - Identify and addresses issues that need to be resolved on the way to standardization of technology
Deliverables - Vision document, research report, white paper, standardization project proposal, standardization roadmap

Identified Standardization Item

RRSA Session

PAR Proposal

Standards Committee

YES

NO

Almost

PAR – Project Authorization Request
ICAID Industry Connections Activity Initiation Document

Study Group
Works out the scope, need and purpose of a standards development activity in a 3 months long project

YES

Study Group Proposal

Standards Committee

READY?
Numerous IEEE Emerging Technologies Standardization projects were initiated and executed predominantly by Industrial and academic researchers, members of S/C Technical Committees, participants in FDC Initiatives. Often Industrial entities and consortia recruited academic researchers to run research and standardization of emerging technologies. A number of academic researchers became standardization projects members, Standards Working Group chairs and chairs of Standards Committees. Several academic faculty standards volunteers became active, e.g. chairs of IEEE Standards Association’s key governance committees, including the IEEE SA Board of Governors.
Examples of Emerging Technologies IEEE/ComSoc Standards and Projects Originated from FDC Initiatives

- IEEE P1913.1 - Software-Defined Quantum Communication
- IEEE 1923.1-2021 - Standard for computation of energy efficiency upper bound for apparatus processing communication signal waveforms
- IEEE P1924.1 - Recommended practice for developing energy efficient power-proportional digital architecture.
Call for Participation
Industrial/Academic Researchers and Industry practitioners are invited to:

- FDC Future Networks Initiative’s Standards Working Group
  https://futurenetworks.ieee.org/
- FDC Public Safety Technology Initiative:
  https://publicsafety.ieee.org/
- ComSoc Standardization Programs Development Board activities
  https://www.comsoc.org/about/boards/standardization-programs-development-board
- IEEE Communication Standards Magazine
- IEEE Conference on Standards for Communications and Networking
  https://cscn2021.ieee-cscn.org/
- Become members of IEEE SA and contribute to IEEE Standards Development
  https://standards.ieee.org/
- Ballot IEEE standards in the area of your expertise
  https://standards.ieee.org/faqs/balloting.html
- Publish your Standards contributions on IEEE SA Contributor Collector:
  https://standards.ieee.org/develop/contributors-collection/
Thank You