TTC 標準化人材育成セミナー
「グローバルビジネスにおけるデジュール・フォーラム標準化機関の活用」

IEEEの活用と今後の展望

コーデンテクノインフォ株式会社
エブリセンスジャパン株式会社
IEEE802.11 TGai chair
眞野　浩

Date: 2017-10-02

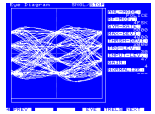
Agenda

- 自己紹介(私と標準化)
- IEEE-SAの概要
- IEEE-SAにおける標準化の流れ
- IEEE802.11aiでの標準化の奇跡

Hiroshi Mano

- **Hiroshi Mano is the President and CEO of EverySense,Inc and also CEO of Koden Techno Infor K.K.**
- **His career spans over 30 years of working in the fields of wireless networking and electronic equipment technology. He developed a vast amount experience and knowledge in those fields and was heavily engaged in standardization activities. Hiroshi received Philosophical Doctor degree of Engineering at University of Yamanashi.**
- **His previous responsibilities also include the role of CTO at Allied Telesis Holdings K. K., Mobile Internet Service Inc and President and CEO at Root Inc. He continues to be an active player in standardization. He is currently serving as a Chair for IEEE 802.11 TGai WG., and a Vice Chair of ITRC (JSPS 163rd Committee on Internet Technology). He is a member of IEICE, IEEE, and IPSJ.**

My history of Wireless Standard 1/3
Before the Standard of IEEE802.11



1993
- 1st SDR

1996
- 2.4GHz 2Mbps DSSS Radio Modem

1997
- Full SDR Receiver

1998
- Spectrum & Vector Analyzer

1999
- 2.4GHz Wireless IP Route

- **I have been believing that the good technology becomes global standard naturally.**

My history of Wireless Standard 2/3
After the Standard of IEEE802.11

1999

- Mobile Internet Service Operator with 802.11b

2003

- High Speed Hand Over 260km/h by 802.11g

2005

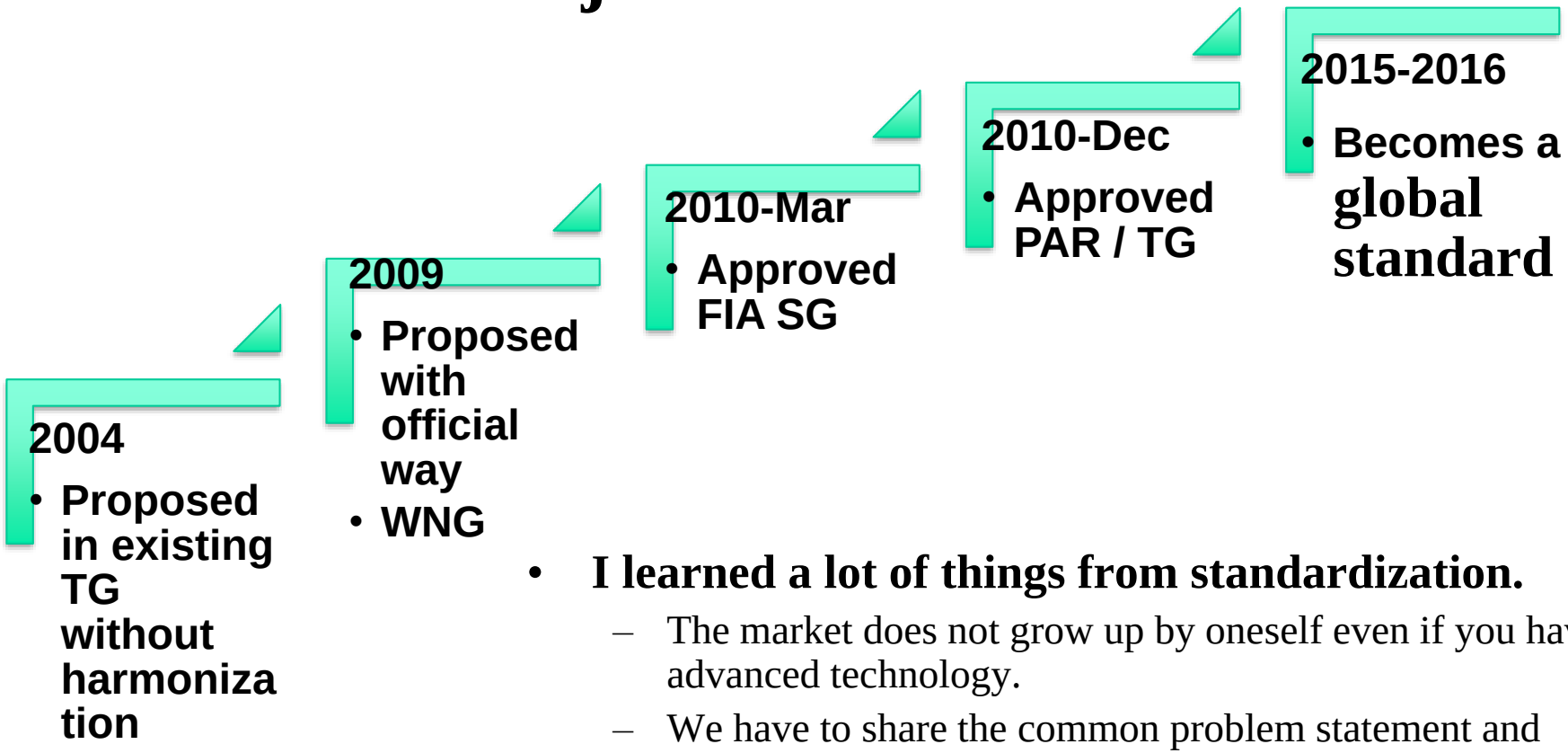
- Train system with 802.11a

2005

- Multi band operation with 802.11a/b/g & PHS

- **I have been believing that I can create new market by myself if I just chose an existing standard.**

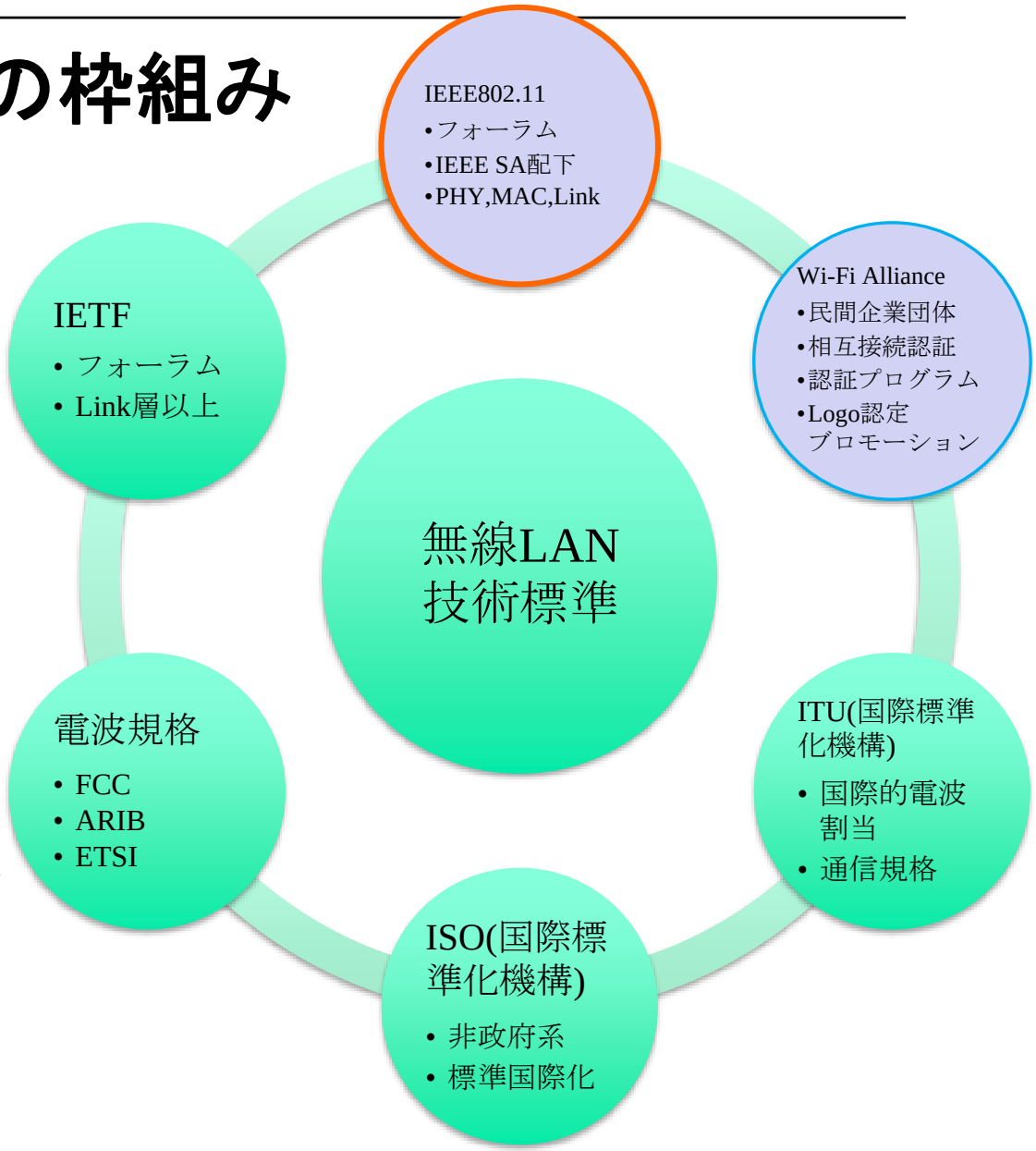
My history of Wireless Standard 3/3
After join the IEEE802



- **I learned a lot of things from standardization.**
  - The market does not grow up by oneself even if you have advanced technology.
  - We have to share the common problem statement and propose the solution to that.
  - We need harmonize, socialize and keep the fairness of operation.

無線LAN標準化の枠組み

- **IEEE802.11**
  - フォーラム型
  - ベンダー主導
- **Wi-Fi Alliance**
  - 民間企業連合
  - ベンダー
  - オペレーター
  - マーケティング主導
- **ITU/ISO**
  - デジュール型
- **電波規格**
  - 各国の電波法により制定
  - 無線LANは、国際共有バンド
- **IETF**
  - フォーラム型
  - ベンダー+学術系

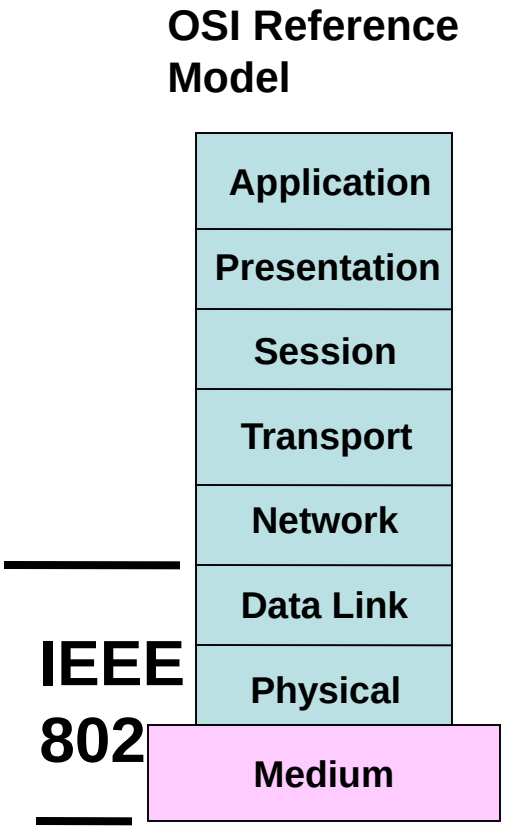


IEEE802.11 標準化

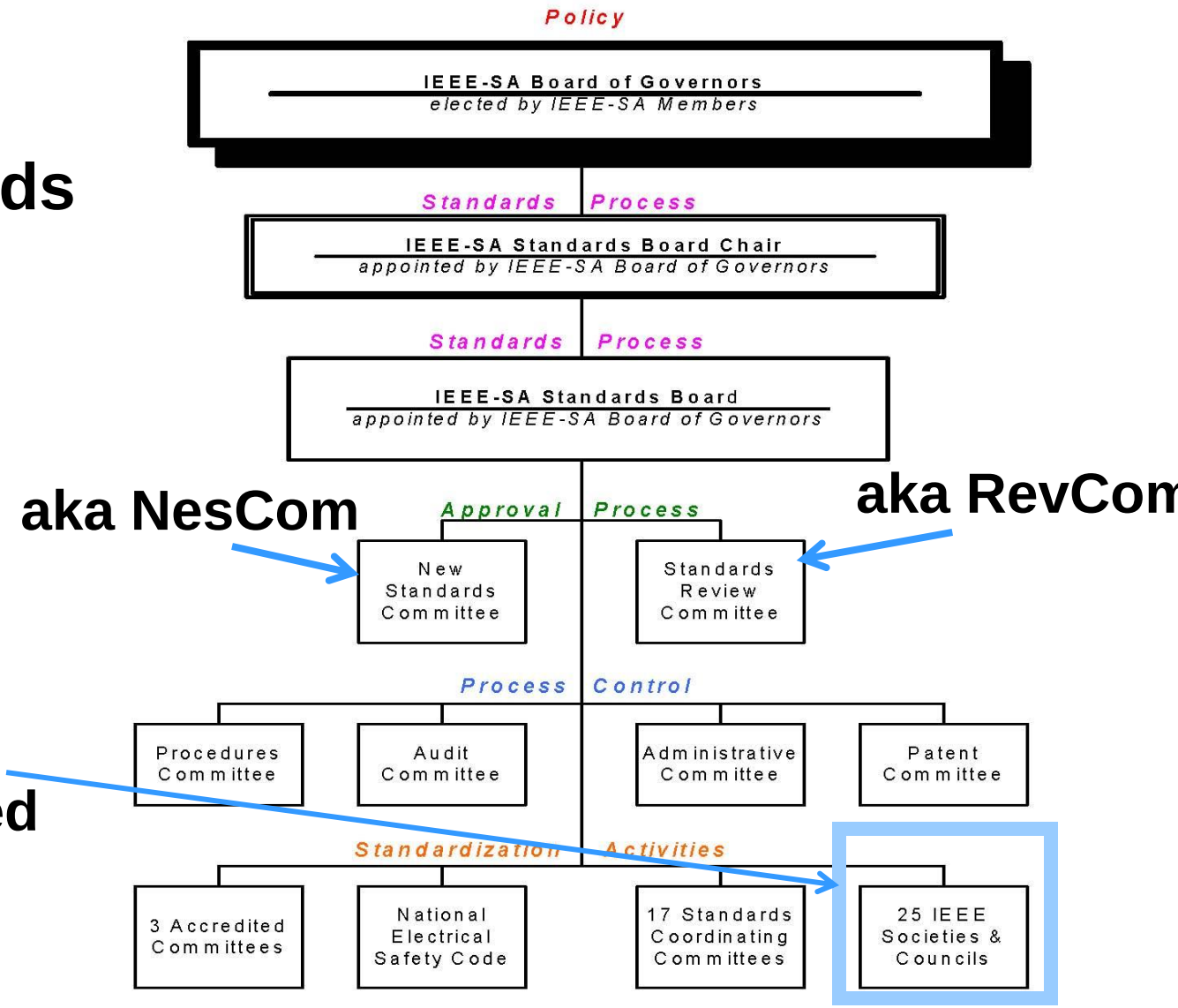
- **The Institute of Electrical and Electronics Engineers, Inc. (米国電気電子学会)**
  - 一般的な学会活動
  - 標準化活動 (Standards Association)
    - IEEE488　　GP-IB
    - **IEEE802　　LAN/MAN**
    - IEEE1394　　FireWire/i.LINK

Who we are

- **IEEE Project 802 LAN/MAN Standards Committee (aka IEEE 802 or LMSC)**
  - Develop LAN and MAN standards
  - Mainly for link and physical layers of the network stack
  - In operation since September 1980



IEEE Standards Organization



IEEE 802 is here: a standards committee formed by the Computer Society

All those dots….decoder ring

- 802.1 Bridging and Architecture – generally the top of the link layer
- 802.3 Ethernet
- 802.11 Wireless LAN (WLAN)
- 802.15 Wireless Personal Area Network (WPAN)
- 802.16 Broadband Wireless Access (BWA)
- 802.18 Radio Regulatory TAG
- 802.19 Coexistence
- 802.21 Media Independent Handover
- 802.22 Wireless Regional Area Networks (WRAN)
- 802.24 Smart Grid TAG

IEEE 802 Organization

July 2017

EXECUTIVE COMMITTEE (EC)

CHAIR
Paul Nikolich

Working Group/TAG Chairs

802.1
BRIDGING/ARCH
Glenn Parsons

802.3
Ethernet
David Law

802.11
WLAN
Adrian Stephens

802.15
WPAN
Bob Heile

802.16
BWA
Roger Marks

802.18 TAG
Radio Regulatory
Rich Kennedy

802.19
Coexistence
Steve Shellhammer

802.21
Media indep. handover
Subir Das

802.22
WRAN
Apurva Mody

802.24
Smart Grid
Tim Godfrey

Hibernating WG Chairs
(non voting)

802.17
Resilent Packet Ring
John Lemon

802.20
MBWA
Radhakrishna Canchi

Appointed Officers

1st Vice Chair
Pat Thaler

2nd Vice Chair
James P.K. Gilb

Executive Secretary
Jon Rosdahl

Recording Secretary
John D'Ambrosia

Treasurer
Clint Chaplin

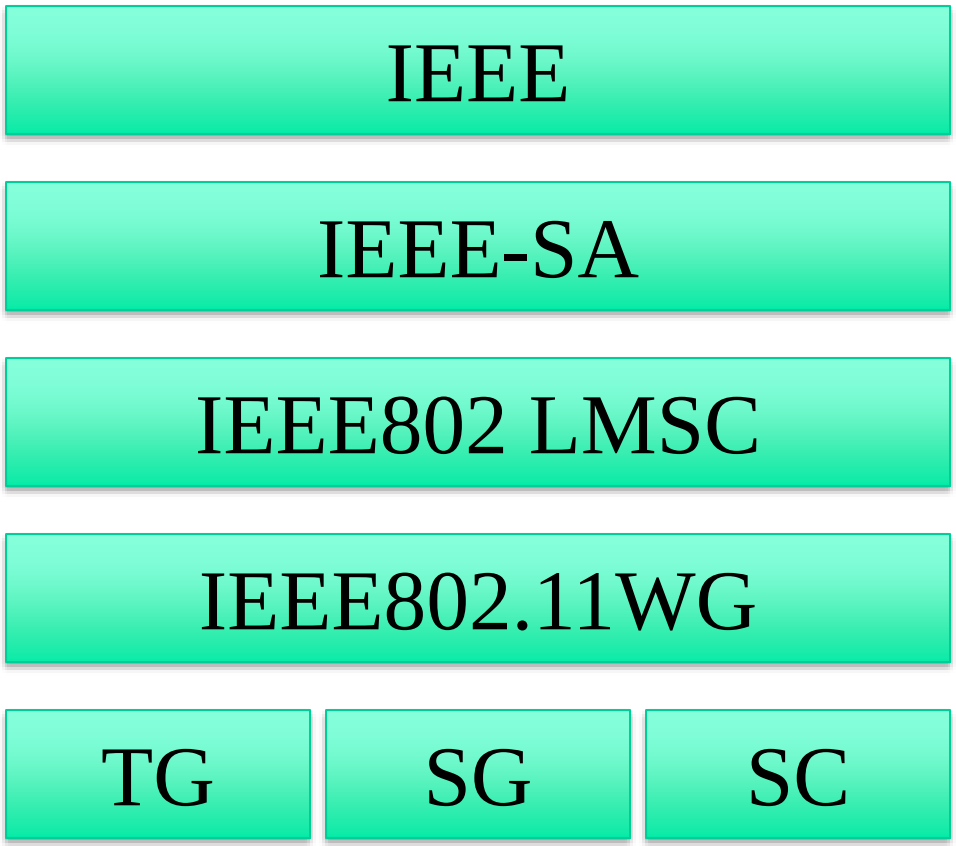
Member Emeritus
(non-voting)
Geoff Thompson

DISBANDED

802.2 LLC
802.4 Token Bus
ECSG TV Whitespace
802.5 Token Ring
802.6 DQDB
ECSG Emergency Services
802.7 Broadband TAG
802.8 Fiber Optic TAG
802.23 Emergency Services
802.9 ISLAN
802.10 Security
802.12 Demand Priority
802.14 CATV


Happy Birthday
IEEE 802.11™!
IEEE

IEEEの階層



P802 LMSCの構成

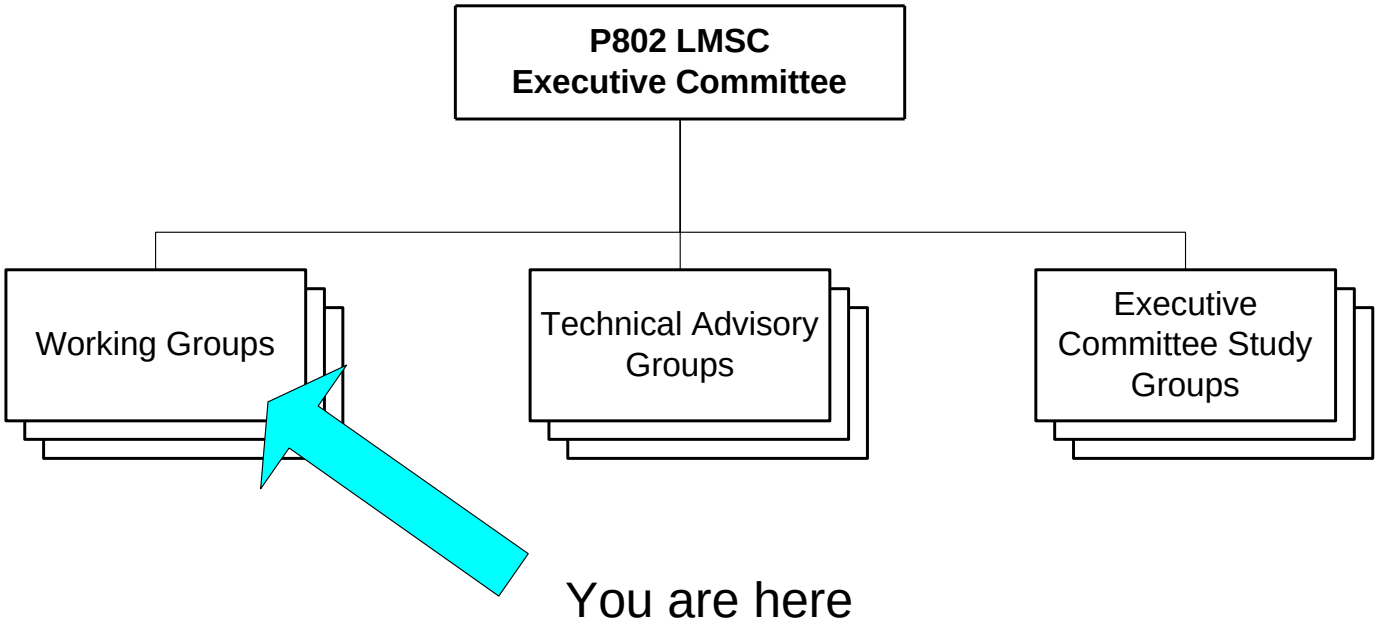


Figure 3.1(OM) – Project 802 Organizational Structure

M4.1.1 Type of Groups

Type of Group	Description
WG	Working Group
SC	Standing Committee
TG	Task Group
SG	Study Group
TIG	Topic Interest Group

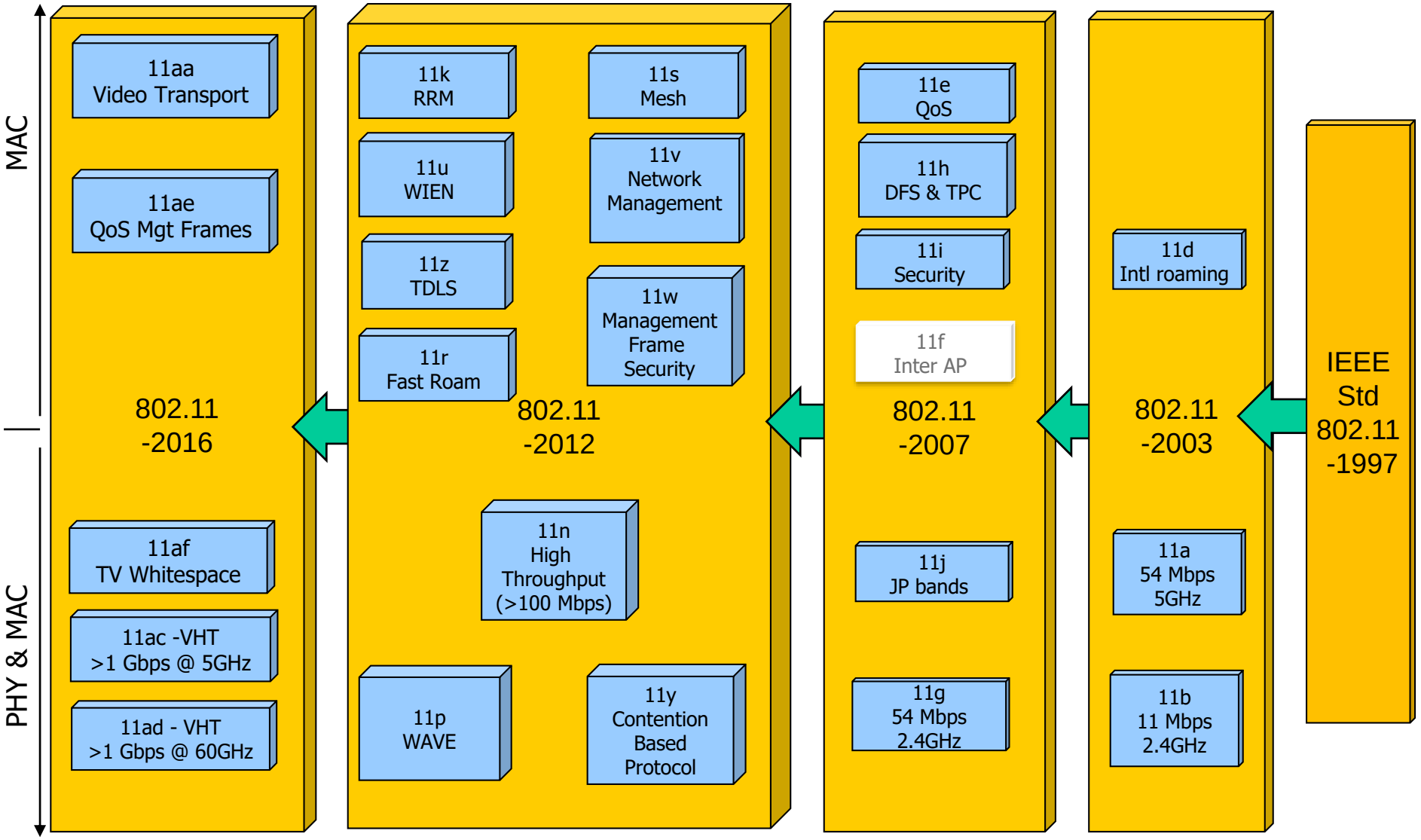
M4.1.1 Groups

Type	Group	Description
WG	WG11	The IEEE 802.11 Working Group
SC	AANI	Advanced Access Networking Interface (AANI)
SC	ARC	Architecture
SC	PAR	PAR review
SC	WNG	Wireless Next Generation
802 SC	JTC1	ISO/IEC JTC1/SC6
TG	AJ	China Milli-Meter Wave (CMMW)
TG	AQ	Pre-association Discovery (PAD)
TG	AK	General Link (GLK)
TG	AX	High Efficiency Wireless LAN (HEW)
TG	AY	Next Generation 60 GHz (NG60)
TG	AZ	Next Generation Positioning (NGP)
TG	BA	Wake-up Radio
TG	MD	Revision (REVmd)
SG	LC	Light Communication SG

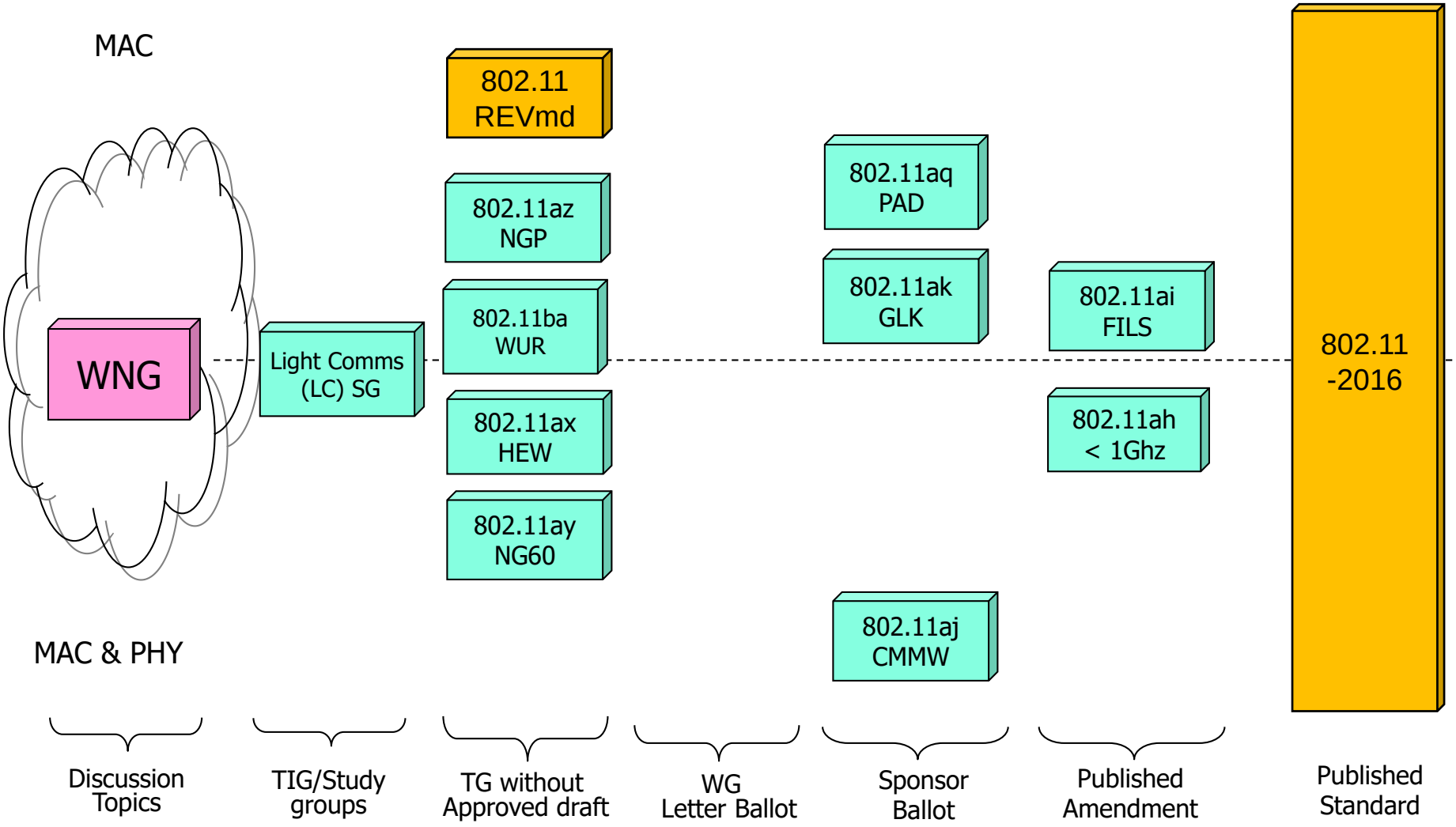
M4.1.3 Officers

Cat	Group	Chair	Vice Chair	Technical Editor	Secretary
WG		Adrian STEPHENS	Jon ROSDAHL Dorothy STANLEY	Robert STACEY Peter ECCLESINE	Stephen MCCANN
SC	AANI	Joseph LEVY	Roger Marks		
SC	ARC	Mark HAMILTON	Joseph LEVY		Joseph LEVY
SC	Coex	Andrew MYLES			
SC	PAR	Jon ROSDAHL	Michael MONTEMURRO		Michael MONTEMURRO
SC	WNG	Jim LANSFORD	Lei WANG		
TG	MD	Dorothy STANLEY	Mark HAMILTON Michael MONTEMURRO	Emily QI Edward AU (subeditor)	Jon ROSDAHL
TG	AJ	Jiamin CHEN	Haiming WANG	Jiamin CHEN Shiwen HE (subeditor)	Open
TG	AK	Donald EASTLAKE	Mark HAMILTON	Donald EASTLAKE Norm FINN	Open
TG	AQ	Stephen MCCANN	Yunsong YANG	Lee ARMSTRONG	Open
TG	AX	Osama ABOUL-MAGD	Simone MERLIN Ron PORAT	Robert STACEY	Yasuhiko INOUE
TG	AY	Edward AU	Sang Kim	Carlos CORDEIRO	Jeorge HURTARTE
TG	AZ	Jonathan SEGEV	Carlos ALDANA	CC WANG	Roy WANT
TG	BA	Minyoung PARK	Yunsong YANG Eunsung PARK		Leif WILHELMSSON
SG	LC	Nikola SERAFIMOVSKI (pro tem)			

IEEE 802.11 Revisions



IEEE 802.11 Standards Pipeline



M4.1.6 Current Membership Status

Status	Number
Aspirant	119
Potential Voter	19
Voter	316
Ex Officio Voter	13

Definitions:

Aspirant: a member who has attended 1 qualifying meeting

Potential Voter: a member who has attended 2 qualifying meetings and will become a voter at the start of the next plenary they attend

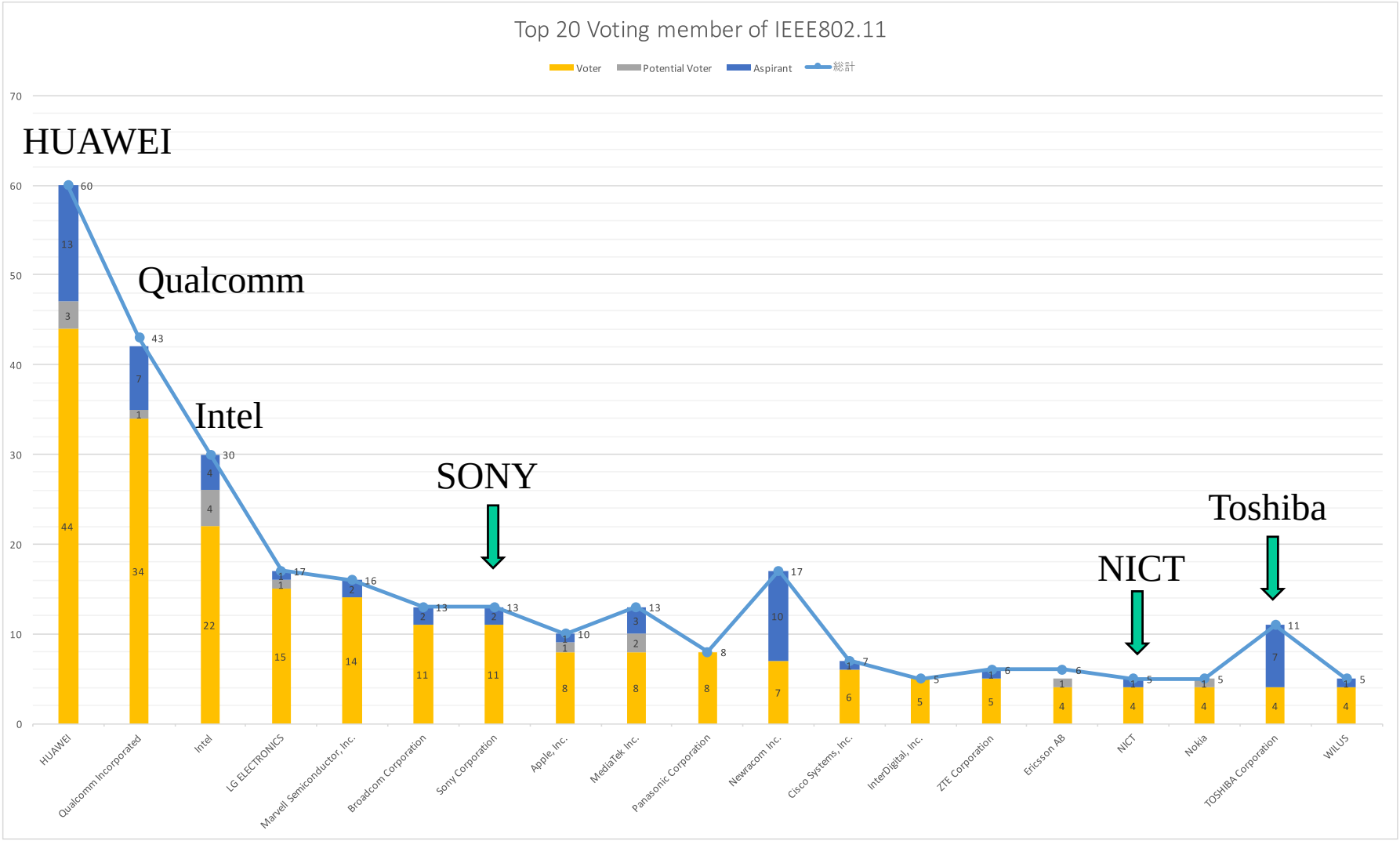
Ex Officio Voter: a voter who has voting rights by virtue of their membership of the 802 EC and has requested to be recorded as an ex officio voter in 802.11

Data as of 2017-05-15

投票権者　Top20 の企業

Affiriation	Aspirant	ExOfficio	Potential Voter	Voter	総計
HUAWEI	13		3	44	60
Qualcomm Incorporated	7	1	1	34	43
Intel	4		4	22	30
LG ELECTRONICS	1		1	15	17
Marvell Semiconductor, Inc.	2			14	16
Broadcom Corporation	2			11	13
Sony Corporation	2			11	13
Apple, Inc.	1		1	8	10
MediaTek Inc.	3		2	8	13
Panasonic Corporation				8	8
Newracom Inc.	10			7	17
Cisco Systems, Inc.	1			6	7
InterDigital, Inc.				5	5
ZTE Corporation	1			5	6
Ericsson AB		1	1	4	6
National Institute of Information and Communications Technology (NICT)	1			4	5
Nokia			1	4	5
TOSHIBA Corporation	7			4	11
WILUS	1			4	5

投票権者　Top20 の企業

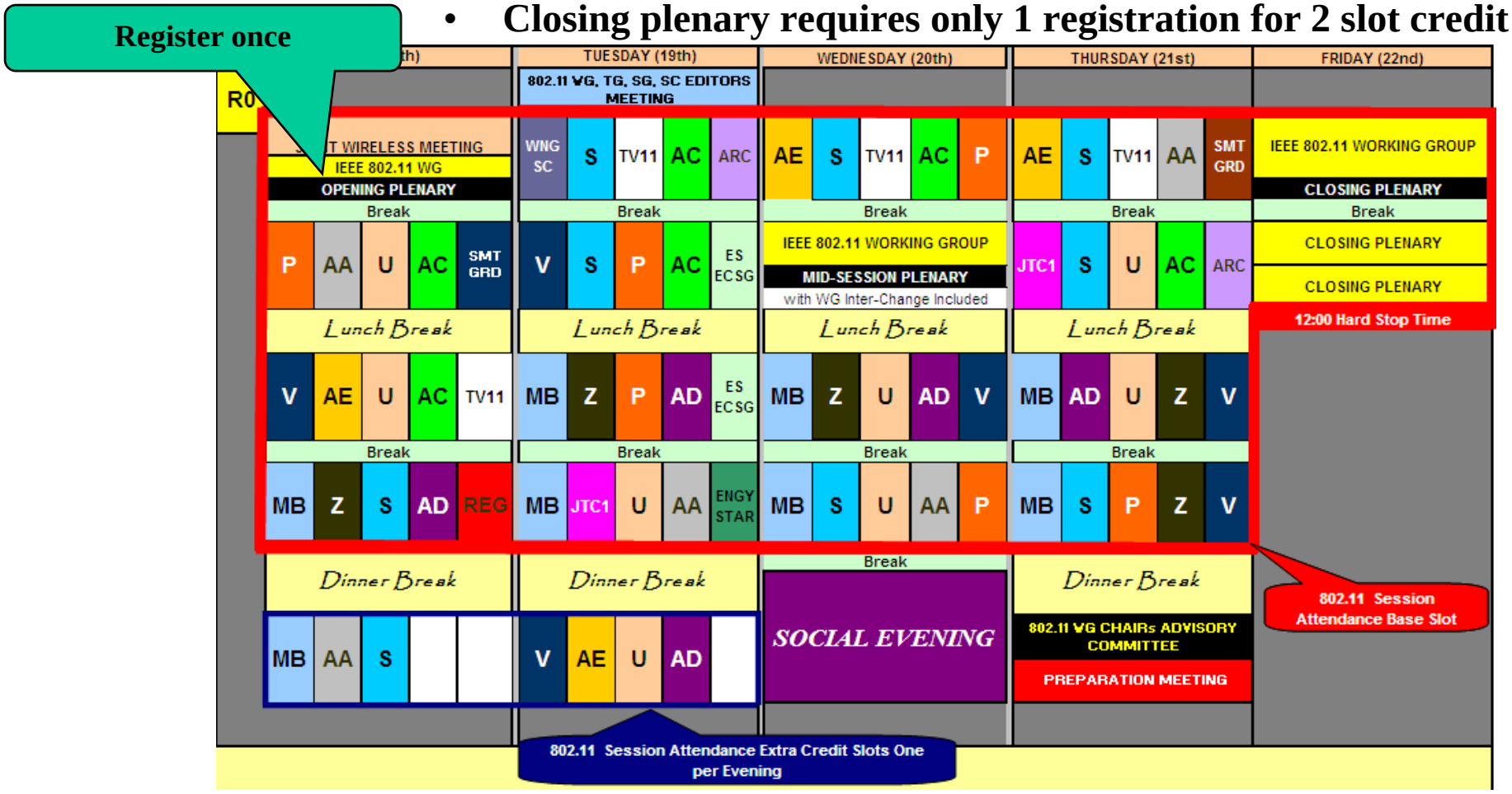


標準の決め方

- 会合は、年6回実施（毎奇数月）
- 意思決定は、会合での議決と書面投票による
- 議決は多数決 (技術:75%、その他50%)
- 基本的に投票権保持者のみが投票できる。
- 投票権は「個人」に付与される。(企業、団体ではない)
- MotionとLB(Letter Ballot)
- 議事運営は、ロバートルールによる

Example Session graphic (interim) Jan 2010

- 18 Normal slots, 2 Extra slots
- 75% attendance requires 14 slots attended
- Closing plenary requires only 1 registration for 2 slot credit

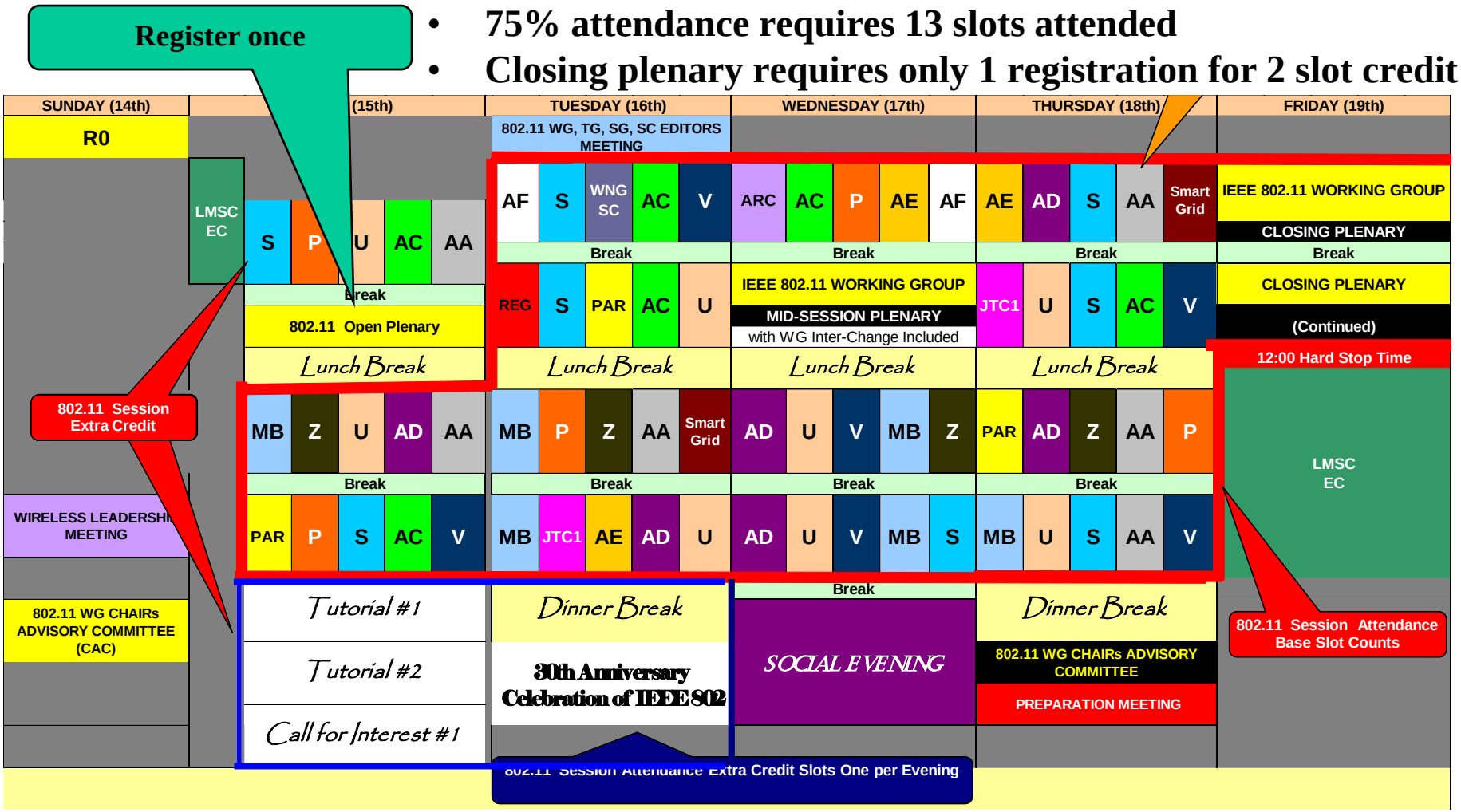


Hiroshi Mano

Source: 11-09/1302r0

Example Session graphic (plenary) Mar 2010

- 17 Normal slots, 2 Extra slots
- 75% attendance requires 13 slots attended
- Closing plenary requires only 1 registration for 2 slot credit

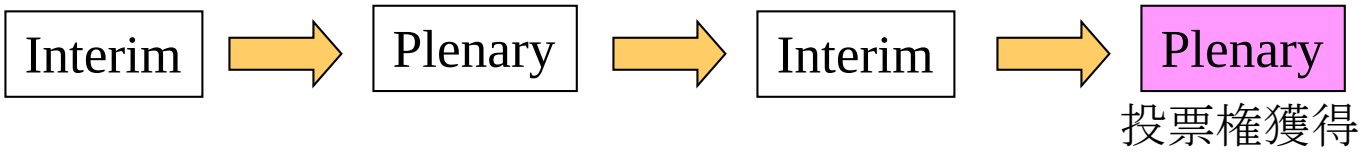


Hiroshi Mano

Source: 11-10/0185r0

IEEE802.11 投票権 (Voting Right)

- **基本的に全て多数決で決める**
  - 投票権は4回の連続するPlenaryのうち3回目の出席で取得
    - 3回のうち1回はInterimで代替可
    - 投票権付与はPlenaryのみ



  - セッションの75%以上出席しないと出席とは認められない
    - Base Slotが18コマだと14コマ以上出席
  - 投票権維持には、直近４回のPlenary中２回(１回は、Interimでも可能)に出席が必要。

投票権取得フロー

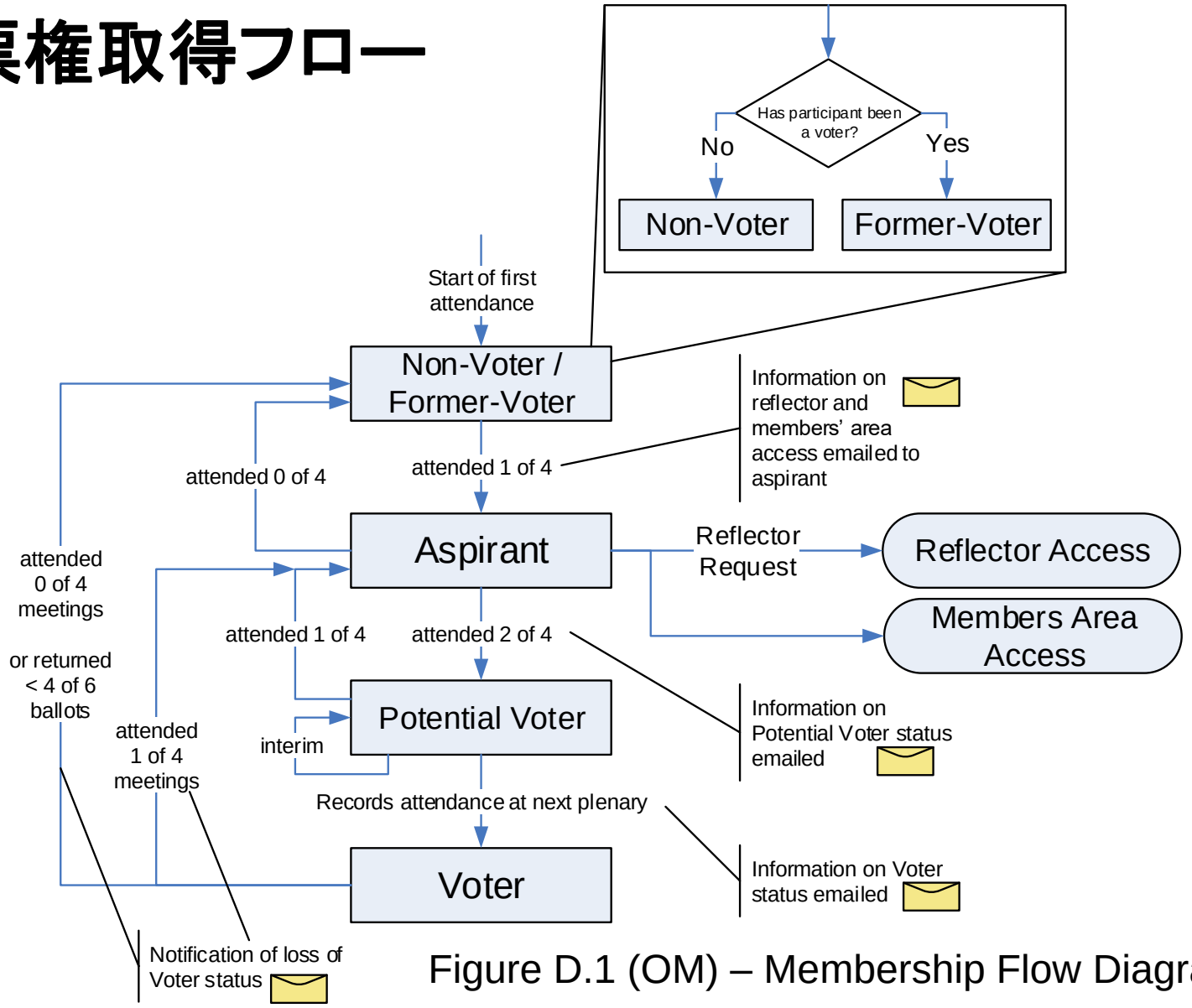


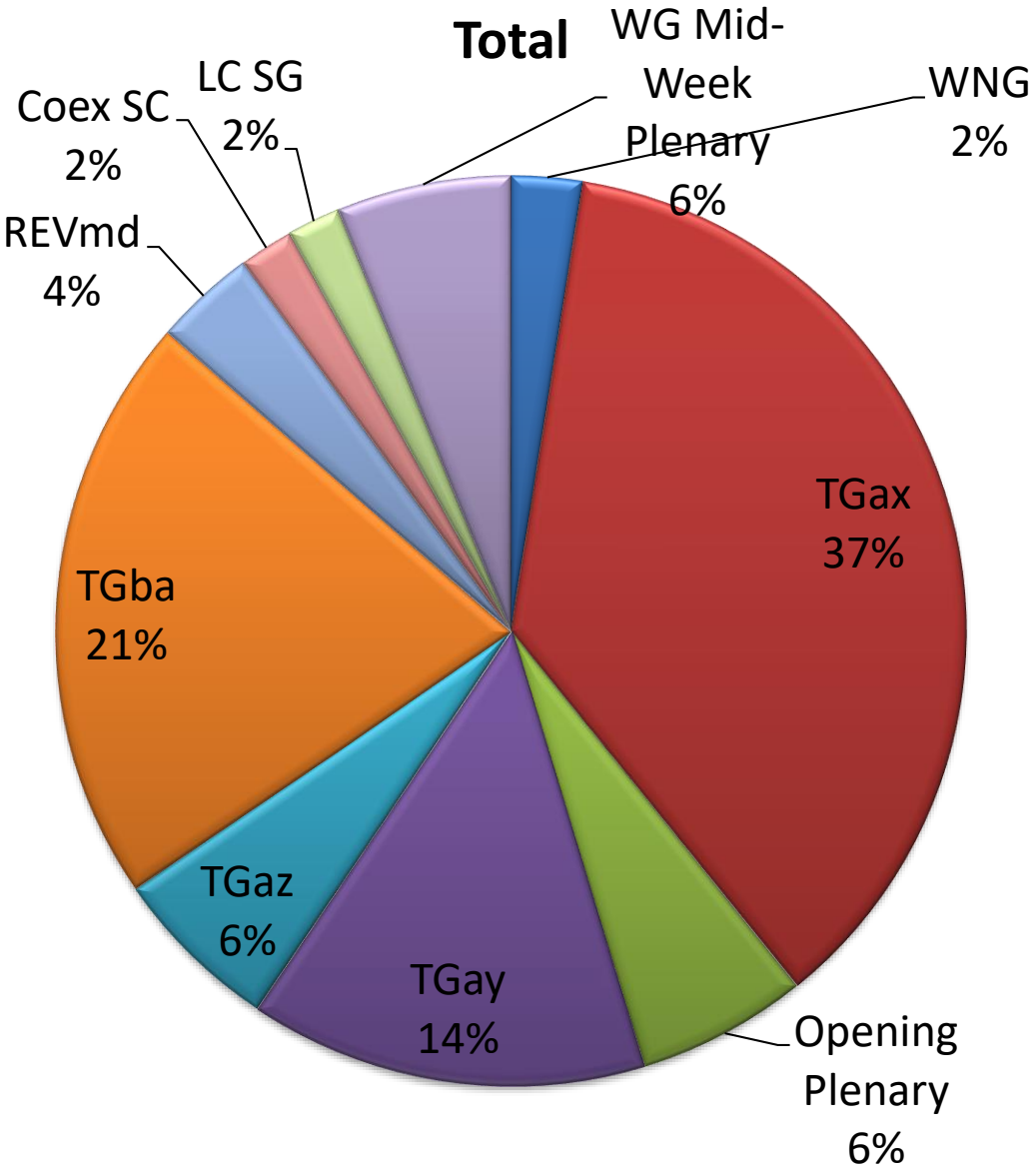
Figure D.1 (OM) – Membership Flow Diagram

Attendance

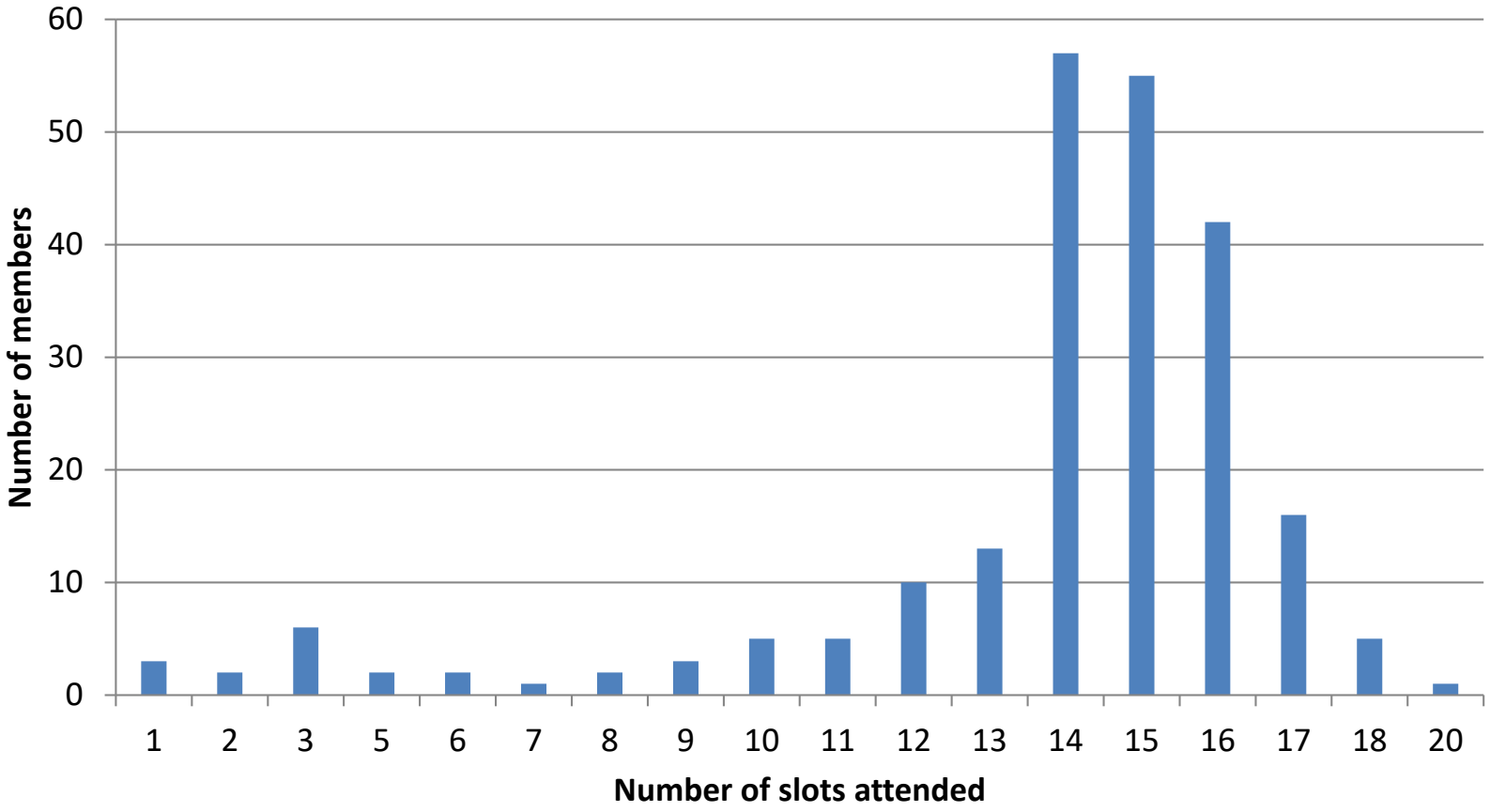
Data as of 2017-09-14 19:00

Group	# Mtgs	Avg	Total	Min	Max
AANI SC	2	8	17	6	11
ARC	3	10	30	7	13
CAC	1	14	14		
Coex SC	2	28	57	20	37
Editors Meeting	1	5	5		
JTC1	1	5	5		
LC SG	2	28	56	22	34
New Members	1	7	7		
Opening Plenary	1	180	180		
REVmd	6	17	107	10	24
TGaj	1	3	3		
TGak	6	5	31	1	8
TGaq	4	13	55	9	23
TGax	11	98	1088	23	129
TGay	8	52	420	40	64
TGaz	5	35	178	22	48
TGba	8	77	622	32	131
WG Mid-Week Plenary	1	184	184		
WNG	1	75	75		

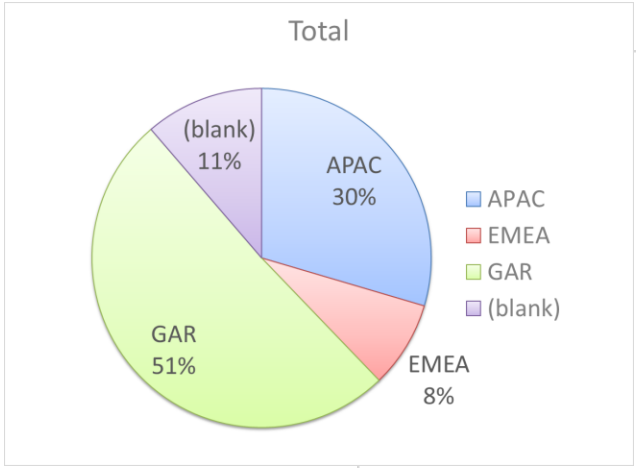
Attendance Total

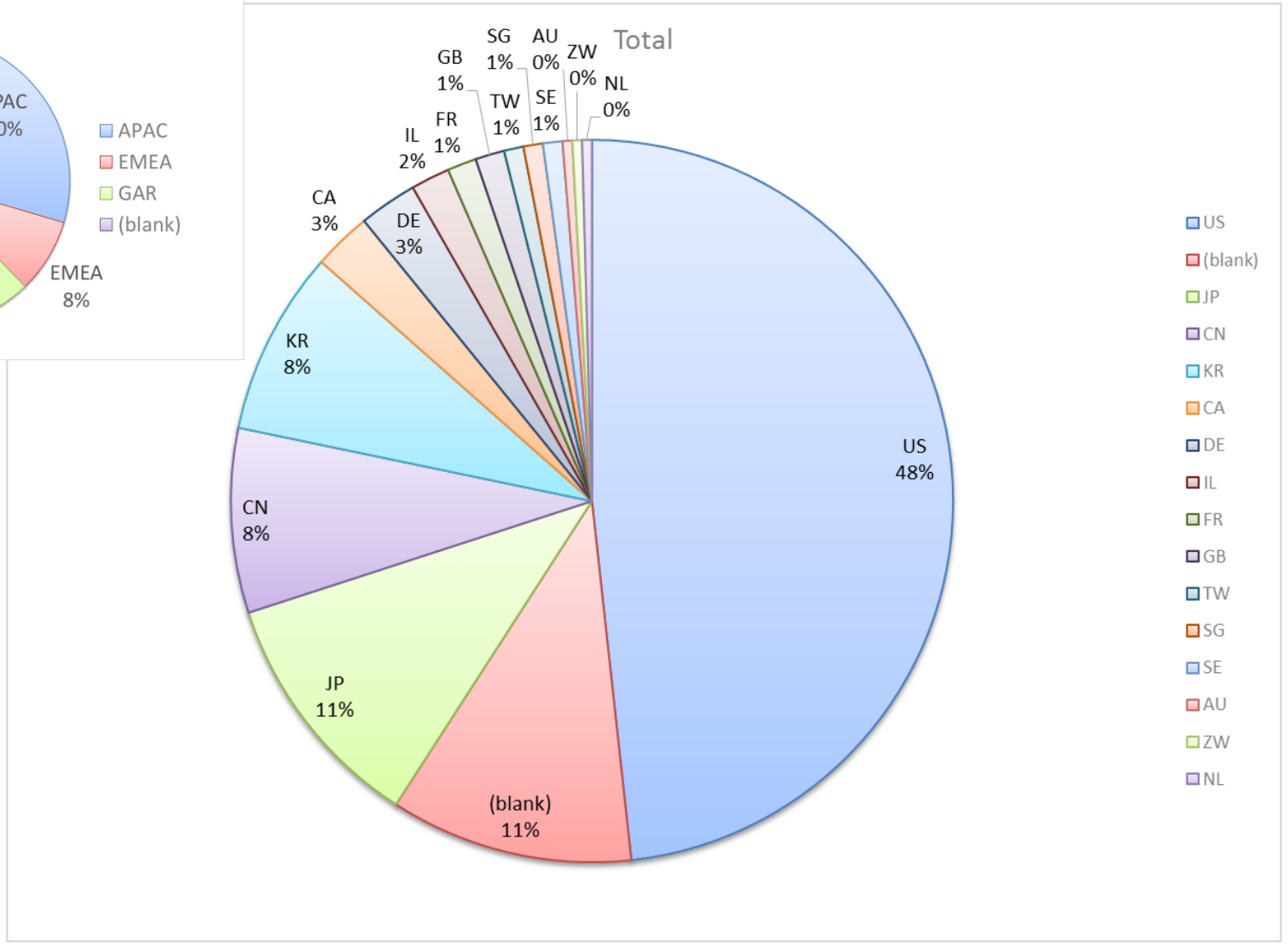


Attendance Histogram

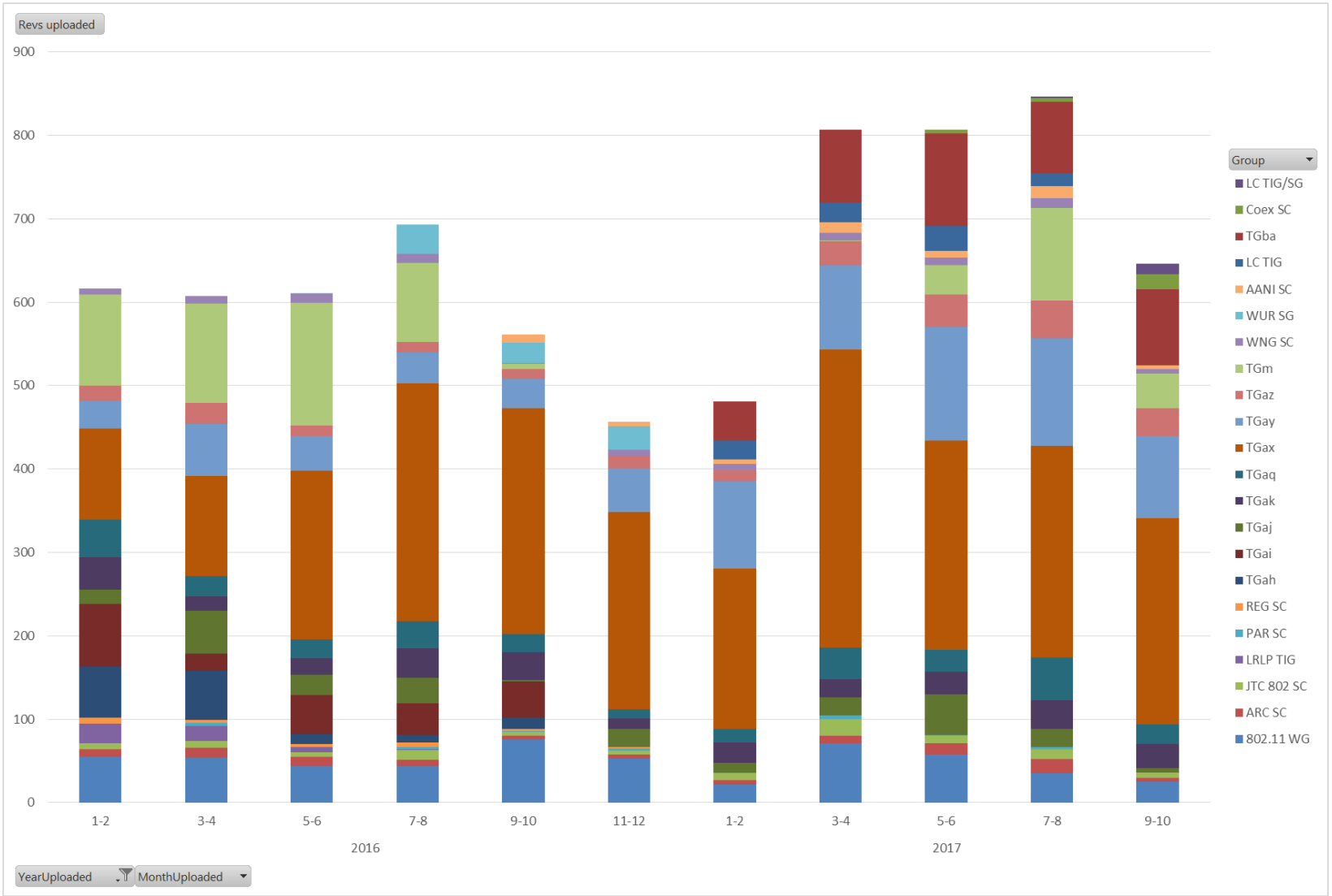


Attendance by Country



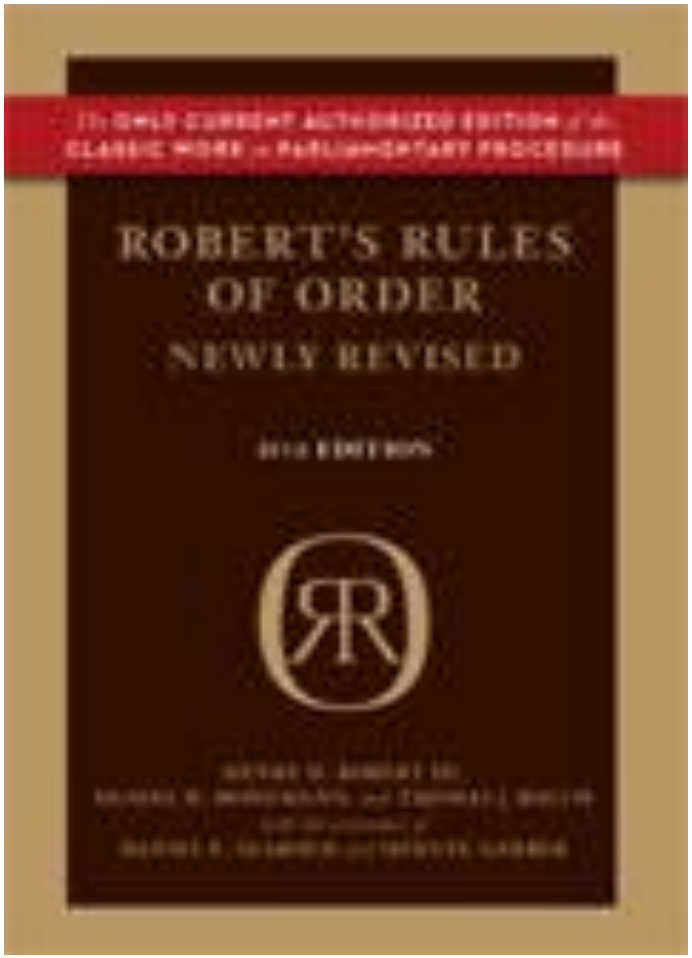


Doc Revision uploads by meeting (month #)

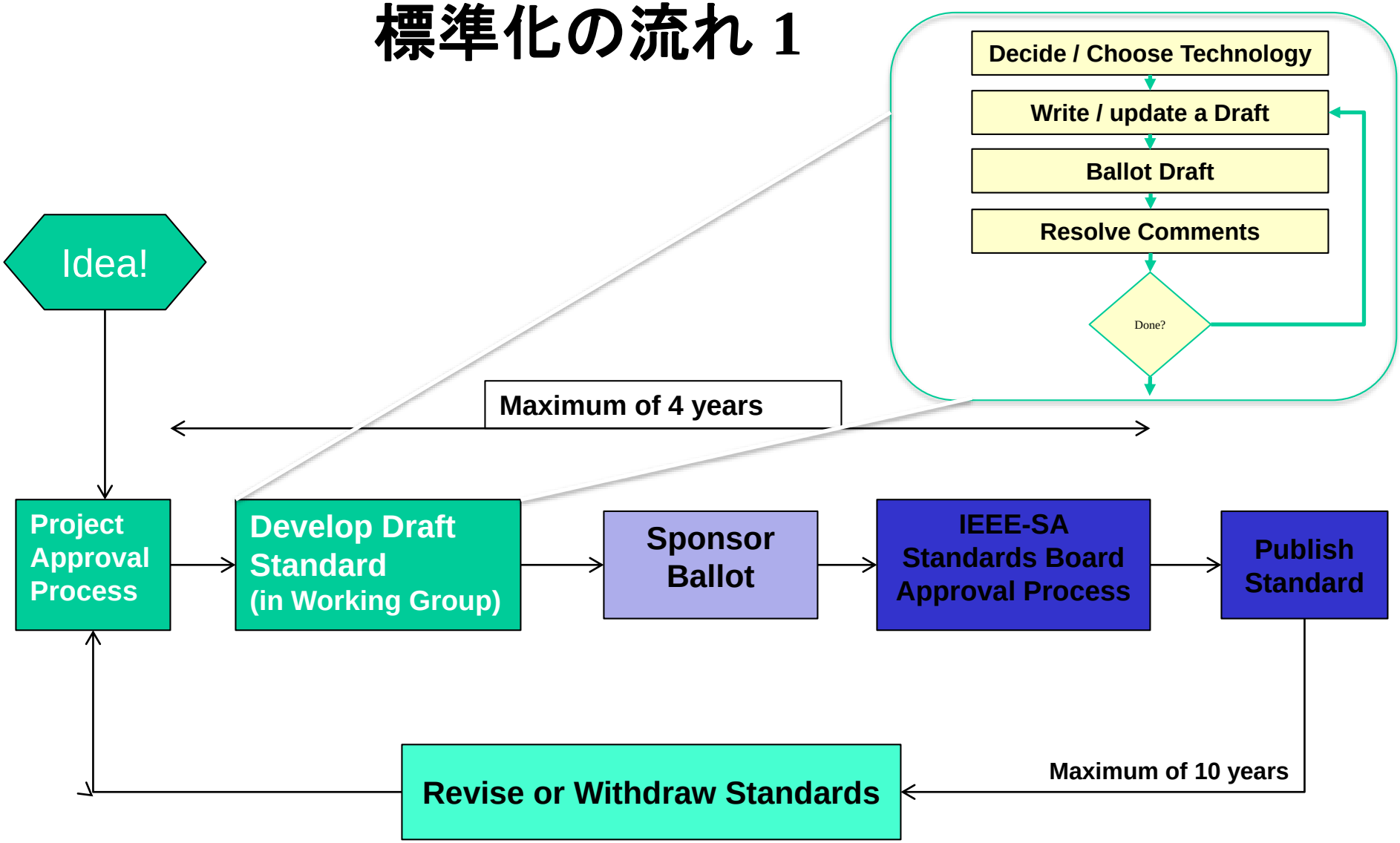


Robert's Rules of Order

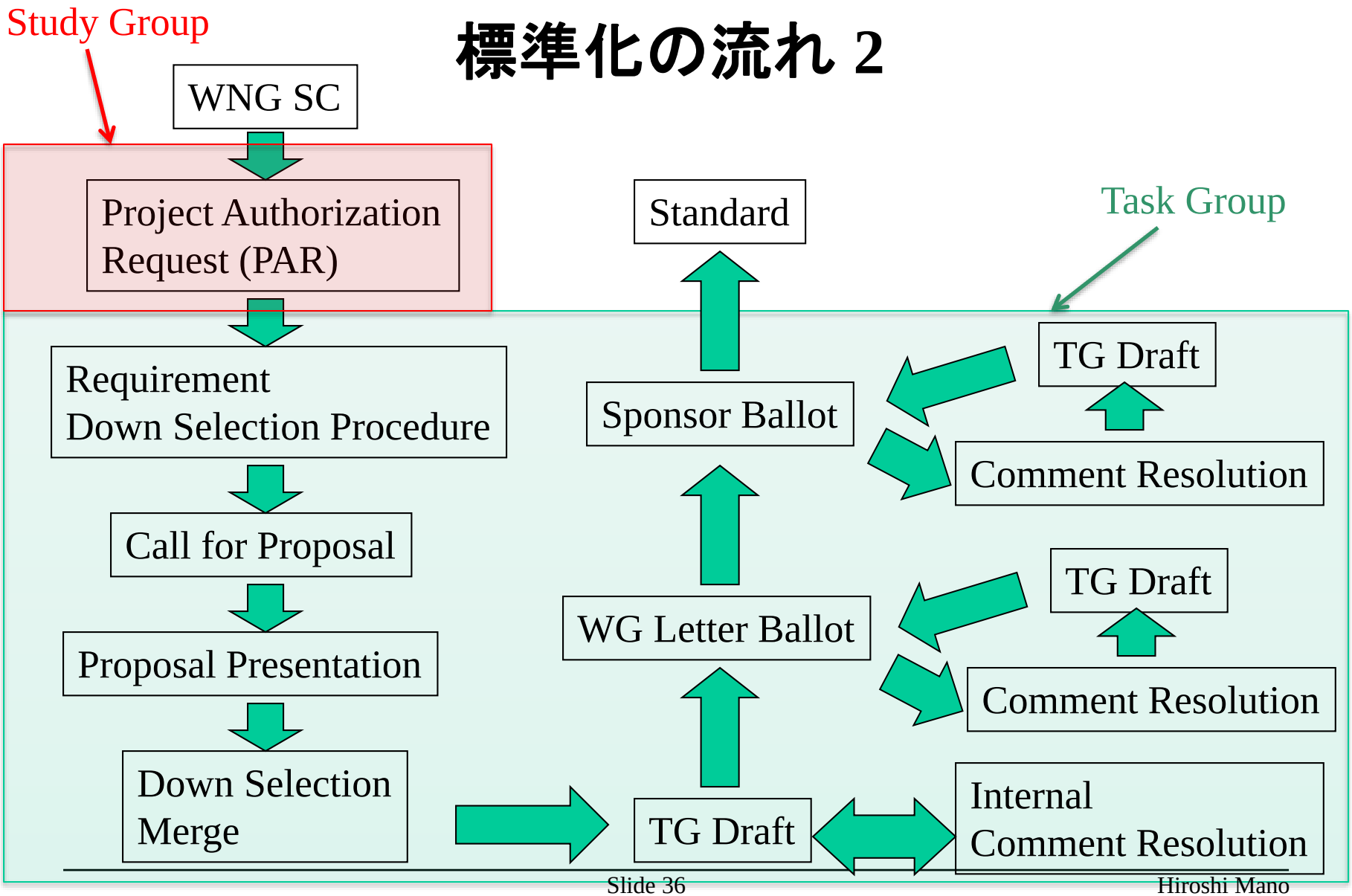
- **ロバートの会議規則 とは、**
  - 1876年にアメリカ陸軍のヘンリー・ロバート将軍が作成。
- **会議規則が守るもの**
  - (1) 多数者の権利（過半数の賛成）
  - (2) 少数者の権利（少数意見の尊重）
  - (3) 個人の権利（プライバシーの権利擁護）
  - (4) 不在者の権利（不在投票）
- **例えば**
  - 発言者は、議長とのみ話せる
    - ローカルトークの禁止
  - 動議提案
    - ２人以上の賛同が必要
  - 審議棚上げ
    - 不十分な動議は、棚上げされる
    - 会期満了で失効
  - 一事不再議
    - 一度議決されたものは，審議できない



標準化の流れ 1


Decide / Choose Technology
Write / update a Draft
Ballot Draft
Resolve Comments
Done?
Idea!
Maximum of 4 years
Project Approval Process
Develop Draft Standard (in Working Group)
Sponsor Ballot
IEEE-SA Standards Board Approval Process
Publish Standard
Maximum of 10 years
Revise or Withdraw Standards

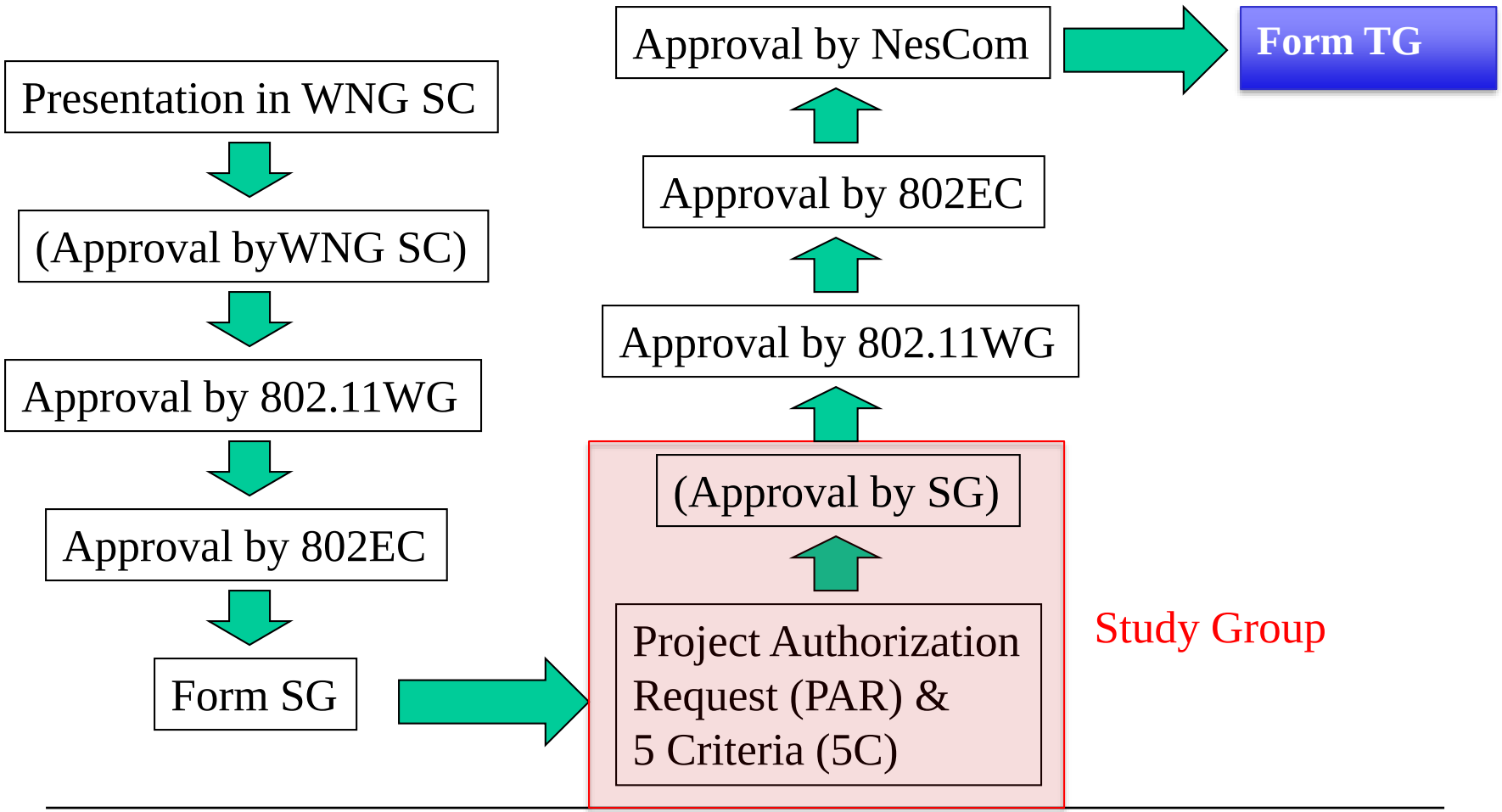
標準化の流れ 2


Study Group
WNG SC
Project Authorization Request (PAR)
Requirement Down Selection Procedure
Call for Proposal
Proposal Presentation
Down Selection Merge
Task Group
Standard
Sponsor Ballot
WG Letter Ballot
TG Draft
Internal Comment Resolution
TG Draft
Comment Resolution
TG Draft
Comment Resolution

Study Group

- **PAR &CSDを策定することが目的**
- **PAR**
  - Project Authorization Request
- **Criteria for standard**
  - Broad Market Potential
  - Compatibility
  - Distinct Identity
  - Technical Feasibility
  - Economic Feasibility

TGができるまで

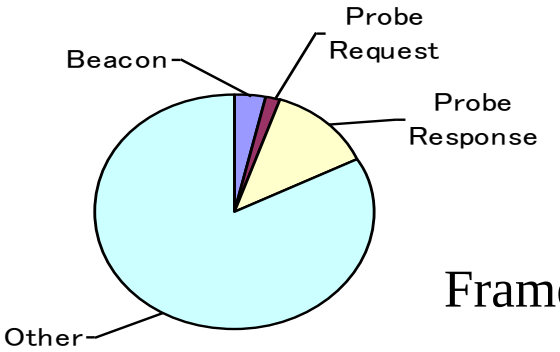

Presentation in WNG SC
(Approval byWNG SC)
Approval by 802.11WG
Approval by 802EC
Form SG
Project Authorization Request (PAR) & 5 Criteria (5C)
(Approval by SG)
Approval by 802.11WG
Approval by 802EC
Approval by NesCom
Form TG
Study Group

最初の提案は、既存のグループから

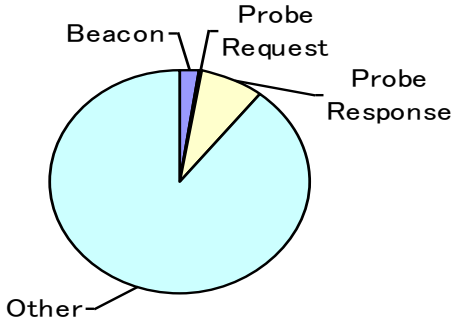
- **2005年09月にMIS Protocol Presentationを@TGu**
  - *- Chair: The MIS Protocol has been developed in Japan. Is it an alternative to IEEE 802.11i?*
  - *- Hitoshi: Yes.*
  - *- Chair: Does this presentation meet some of the TGu requirements?*
  - *- Comment: Yes. The slides will be modified to fit the requirements that are approved this week*
  - *- Comment: This is an alternative way to do authentication segregation at higher layer regarding a previous question. But for this group, we need to be clear about how much needs to be done to support that.*
  - *- Comment: Is this a Layer 2.5 authentication suite, with Layer 2 authentication turned off?*
  - *- Hitoshi: Y*es
- **結果的には、受け入れられなかった**

問題提起という手法

- **2006 1月に再度プレゼン**
  - Comment: Is this a reasonable value?
  - Hitoshi: If TGu uses query/response, it may make it wc maybe we should not use probe method if possible.
  - Comment: What is the document number of the main presentation?
  - Hitoshi: 05/1093r1.
  - Comment: Would the use of a new management frame acceptable?
  - Hitoshi: Yes.
  - Comment: There are two type of probing. One is for STA that is not connected, and the other is for STA already connected tc find better APs. It raises some good points, and we should be careful about it.
  - Comment: It maybe good to add a slide to say it is an extensio of the previous presentation.
- **2006年5月に再提案**
  - 問題意識がまだ低かった



Frames

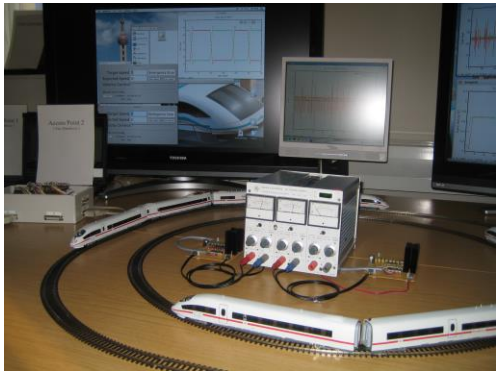


Bytes

- Occupied time may be more important.

2008年　高速ハンドーオーバー新幹線への応用で提案スタート

- **2008年9月**
  - WLAN field trial in high speed moving environment
  - 時速200kmでも、ハンドーオーバー出来るんだよ
  - だから?
- **2009年1月**
  - Broadband V2I Access for High Speed Transportation
  - 高速のV2IでWi-Fiやらない?
  - もうちょっと話聞きたい?　Yes:22, No:0, Abstain:7
- **2009年5月**
  - もうちょっと、細かく書いて再提案
  - 11rでいいじゃん、11pではないかの
  - Study Group 作らない?
  - Yes 2; No 3; もう少し詳しく聞かせてね　23; どっちでもいい 3.
- **2009年7月**
  - さらに再提案
  - Study Group 作らない?
  - Yes 6; No 0; もうちょっと議論しないとね　13; どっちでもいい 0.



鉄道というユースケースに市場性が期待できない

より市場性のある問題提起
認証の高速化するとモバイル

- **2009年9月**
  - AKMを早く、セキュリティも盤石
  - IEEE802.11でモバイルが可能になる
  - IEEE802.11 should proceed to mobile communication.”
  - Yes 8; No 0; もうちょっと聞かせてよ　15; どっちでもいい 1.
- **2009年11月 プレゼンターを増やして、複数提案**
  - "Should IEEE 802.11 proceed to mobile communication?”
  - 質問の視点も変えてみる
  - "Does WNG think that we need further presentations exploring the need for support for mobile communication?”
  - Yes 25; No 0; ちょっと議論いるな3; どっちでもいい 1.

Fast Initial Authentication

- **2010年1月 Initial Authentication という用語に特化する**
  - IEEE 802.11 for High Speed Mobility　真野
  - Example protocol for FastAKM　中野
  - Does WNG think that we need tutorial session exploring the need for support for mobile communication?
    - C: The objective behind this straw poll is to share this topic with the whole of the 802.11 WG, as opposed to WNG.
    - C: I thought the problem was that when you roam from ESS to ESS an initial secure association is required, which is still very slow.
    - C: I think this is a very interesting topic and IEEE 802.11 should address this.

– Yes: 18, No: 1, Abstain: 7

FIA-Study Group 設立へ

- **2010年3月　Fast Initial Authentication @WNG**
  - There will be a follow-up presentation during the closing plenary. The presentation will be less technical.
  - This idea would modify initial association protocol to improve the time taken for initial association.
  - At some point, there will need to be a motion to form a study group.
  - There is some interest in creating a Study Group to look into this problem.

    プレゼンだけで、WGに動議をかけることに

WG approval to form FIA-SG

- **Fast Initial Authentication (FIA) (11-10-0371r3)**
  - Initially presented in WNG this week and has been developed during the last few meetings.
- **Request approval by IEEE 802 LMSC to form an 802.11 Study Group to address fast initial authentication with the intent of creating a PAR and five criteria.**
- **Moved: Hiroshi Mano, 2nd: Clint Chaplin**
- **C: I speak for the motion. This is a corner case of 802 which has not been addressed and was not covered by 11r. Hence this is a genuine problem, especially in fast moving vehicles. Hence I believe it's the time to start thinking about this.**
- **WNG chair: This presentation l G and shows that a study group is nece**
- **TGp chair: This also extends some of the TGp capabi we need.**
- **Vice-chair: I've not seen this before. I think TGu provides some of these advertisement ideas.**
- **TGu chair: Yes, I agree. TGu may provide some of the network discovery, network characteristics and required authentication param**
- **For: 29, Against: 0, Abstain: 7 (Motion passes 100%)**
- **Chair: Hiroshi you willing to stand for a chair pro-tem**

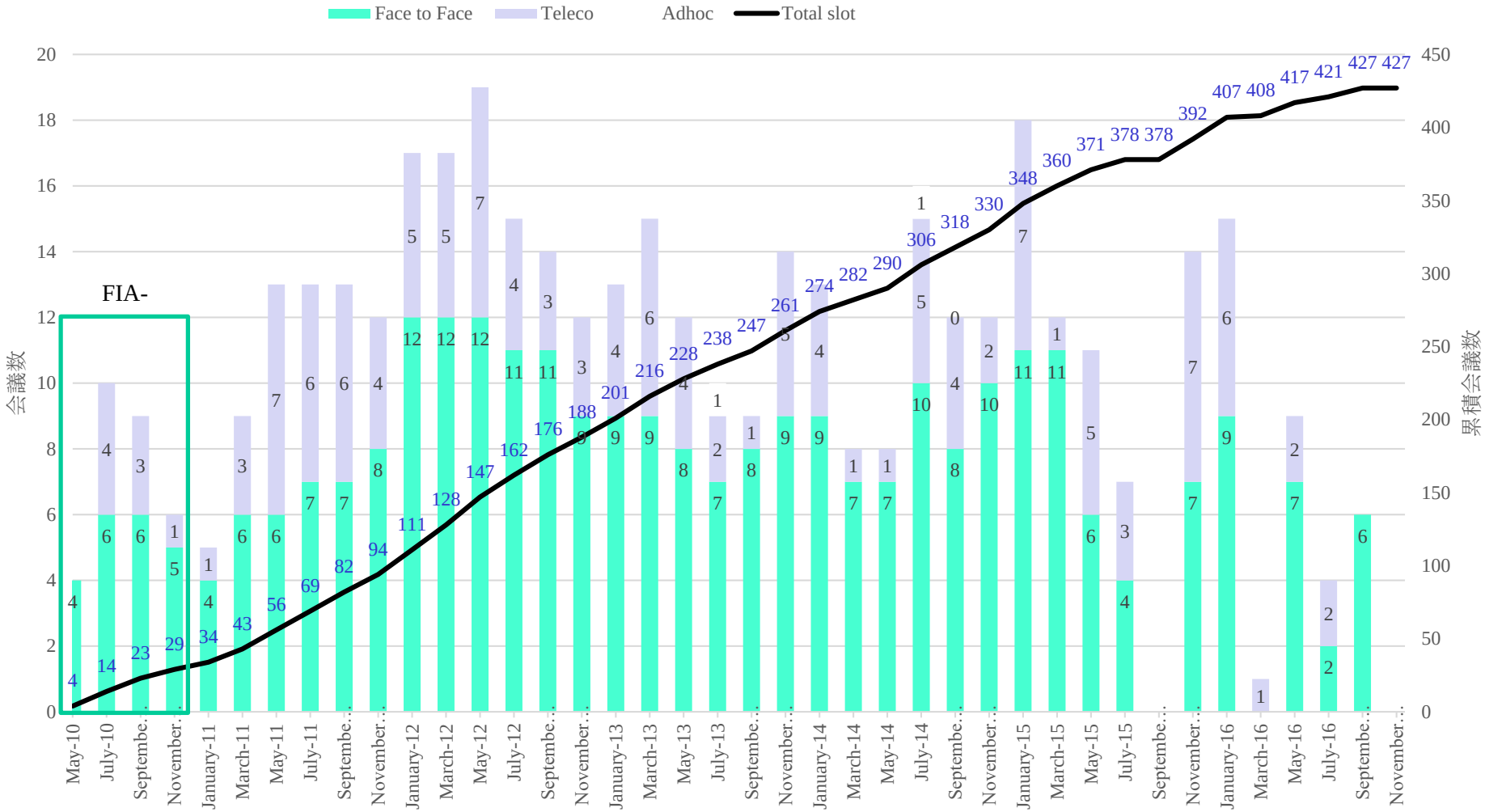
IEEE802.11のターニングポイント

自動車でも利活用できる

TGuとは重複しない

全員賛成

会議数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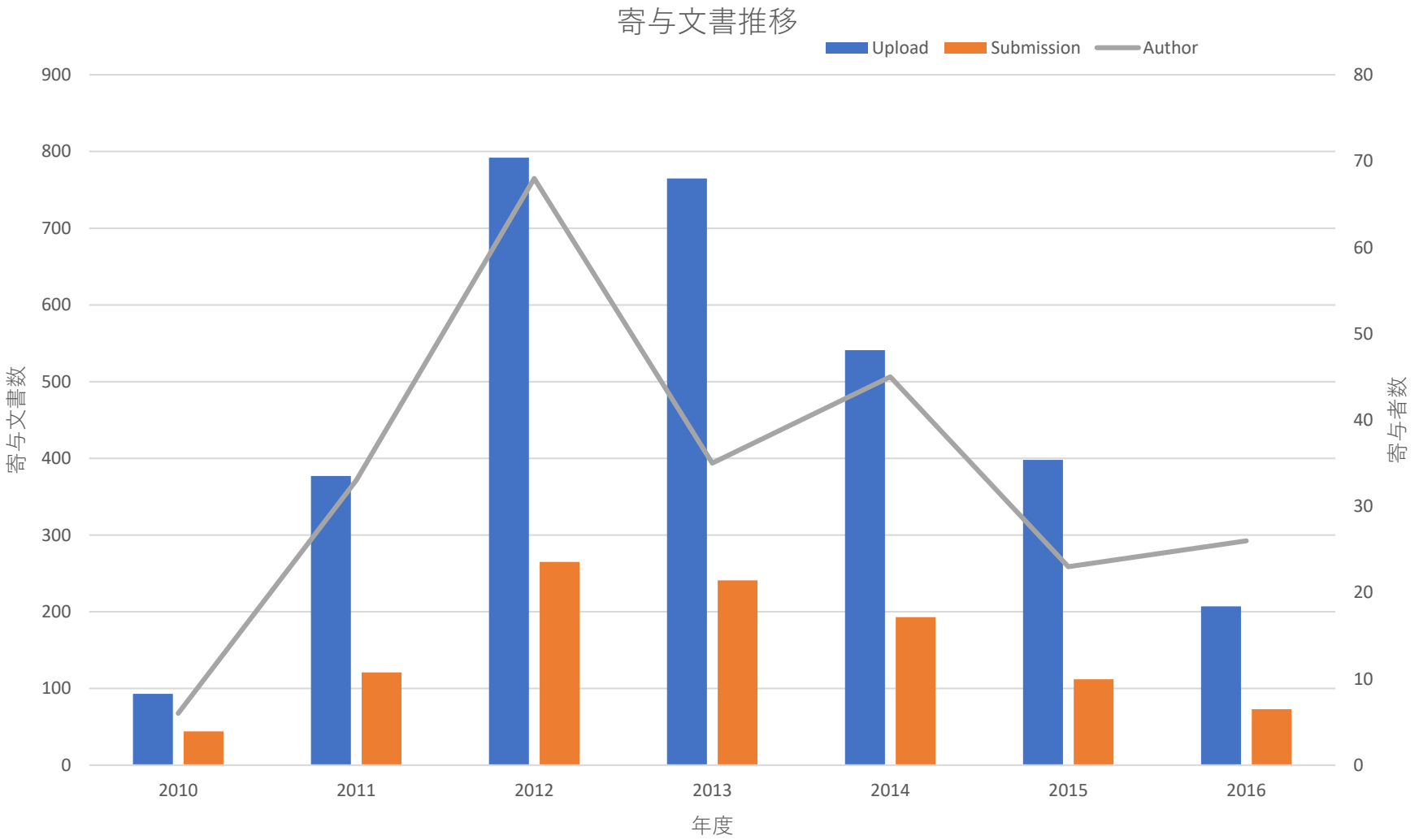
寄与文書数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2014
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2016
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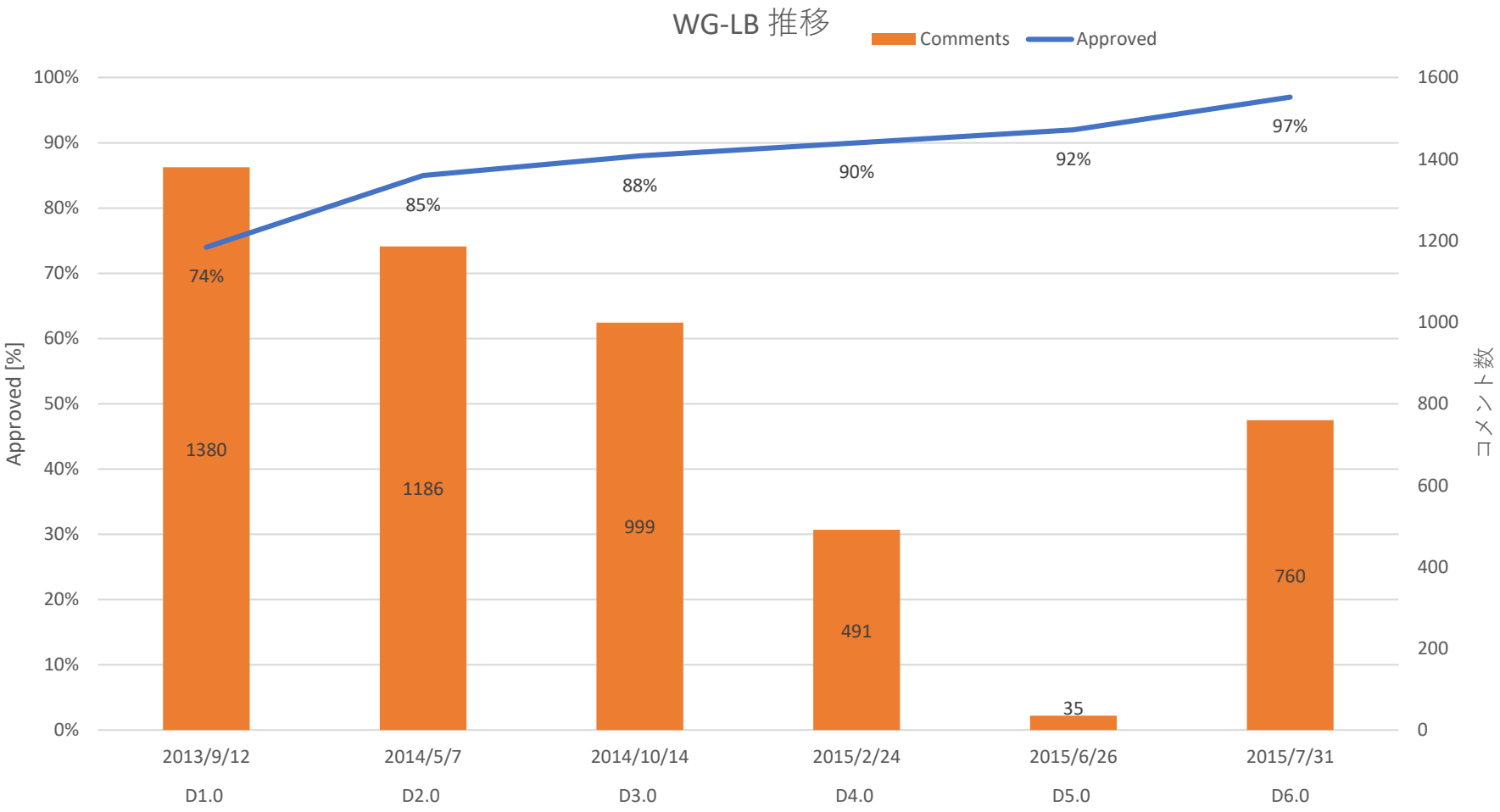
WG投票の推移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2015/2/24
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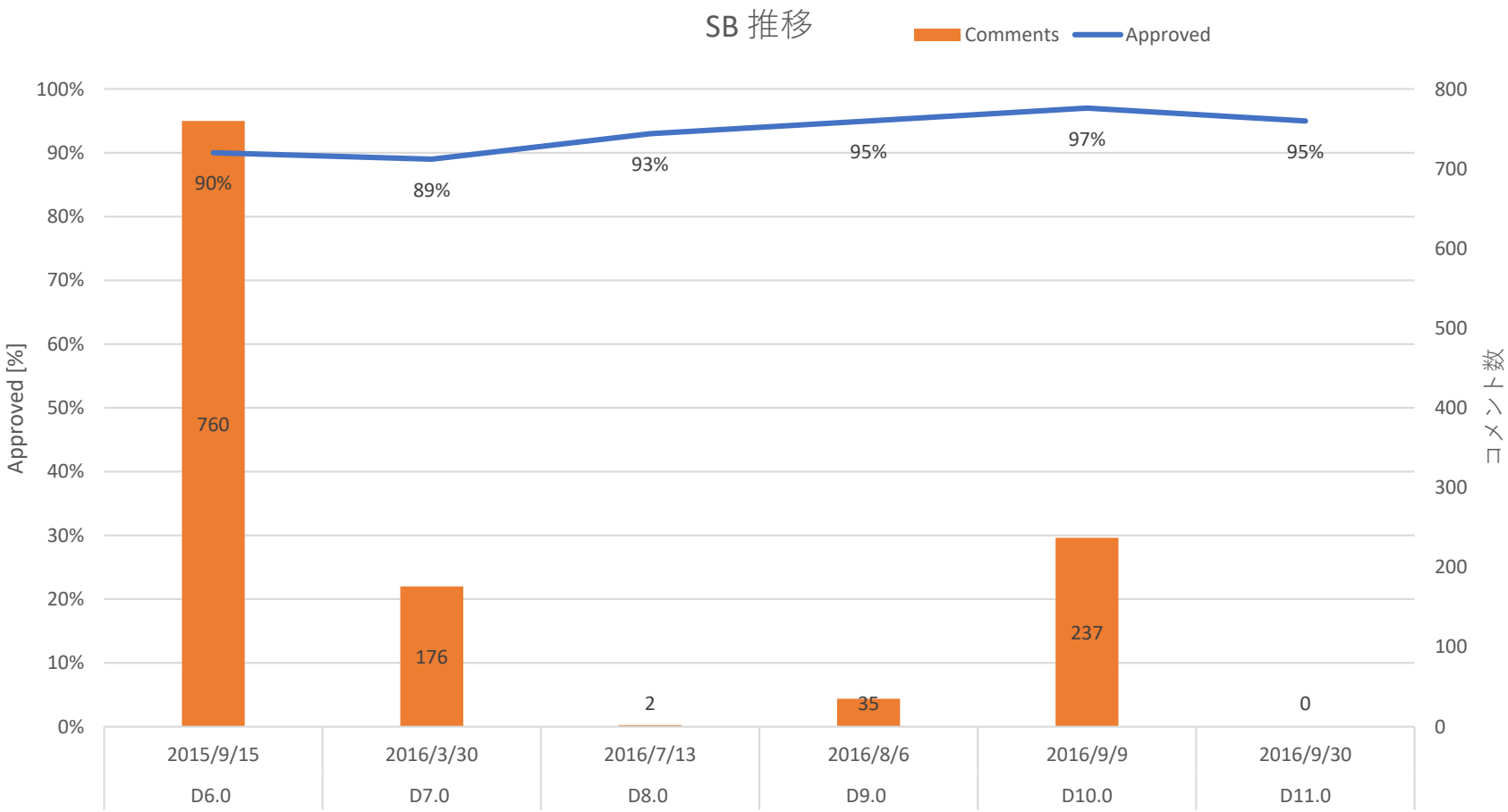
2015/6/26
D5.0
2015/7/31
D6.0

スポンサー投票の推移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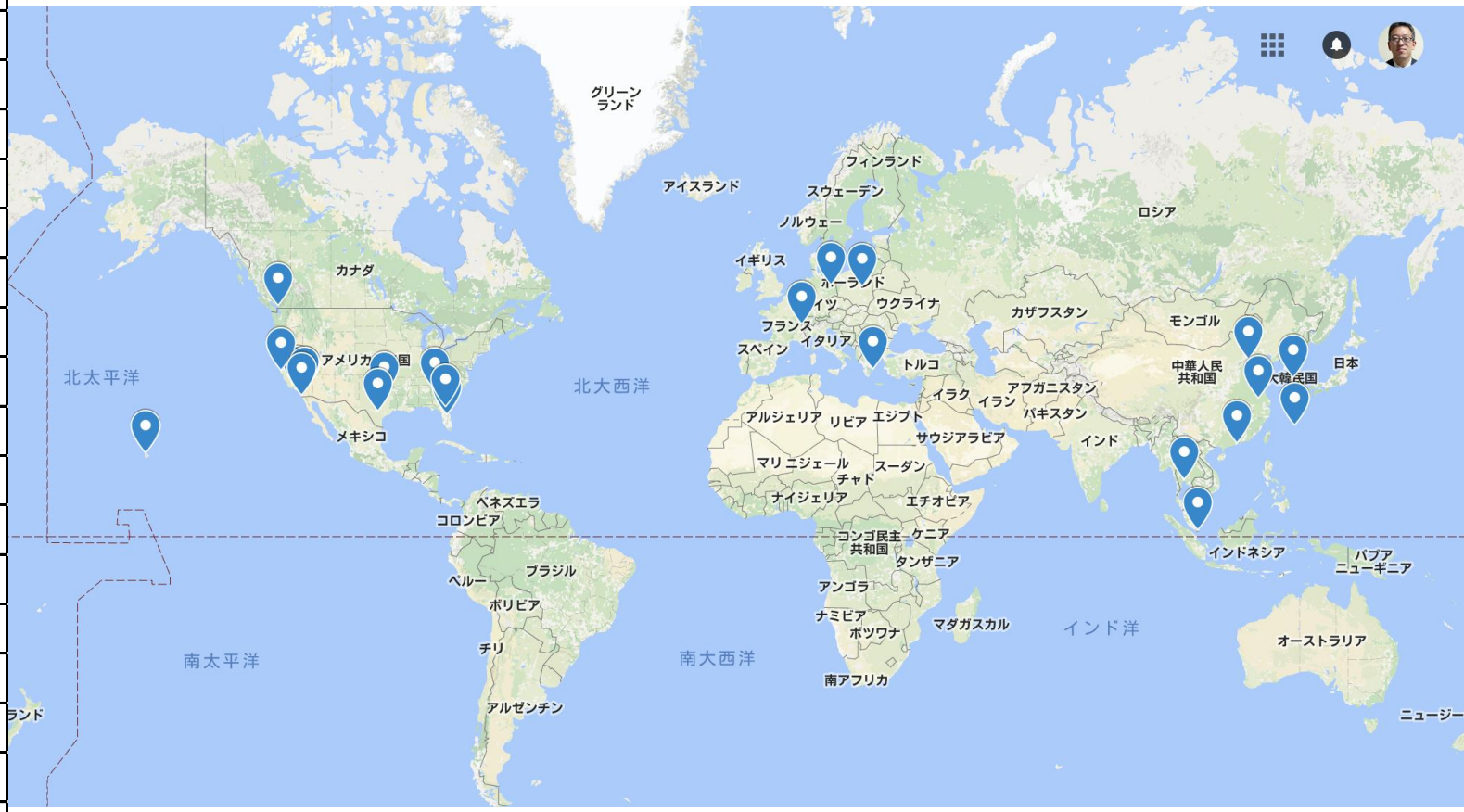
Atlanta	4
Bangkok	1
Beijing	2
Berling	1
Dallas	3
Geneva	1
Indian Wells	1
Jacksonville	1
Macau	1
Nanjing	1
Okinawa	1
Orland	1
Palmsprings	1
San Antonio	3
San Diego	4
San Francisco	1
Singapole	1
Vancouver	2
Waikoloa	6
Warsaw	1
LosAngels	2
総計	**40**

会議開催場所

- 世界　40箇所で開催



標準化とは

- 研究発表の場所ではない
- 市場を創造することが重要
- Use Case と Problem Statement の共有がスタートポイント
- 信頼できる技術による寄与が必要
- 会議運営のスキルが重要
- Normative textを意識すること