



Internet Standards

The IETF Process

NLUUG Spring Conference -10 May 2022





The IETF as an “Organisation”

The IETF: An Overview

The Internet Engineering Task Force is

- Standards Development Organisation (SDO)
- With self-selected individual participants, no formal membership
- Driven by market-based adoption (a *real* standard is one people uses)
- Focussed on Internet technologies
- Bottom-up... and unique!



IETF Mission

The mission of the IETF is to make the Internet work better by producing high quality, relevant technical documents that influence the way people design, use and manage the Internet.

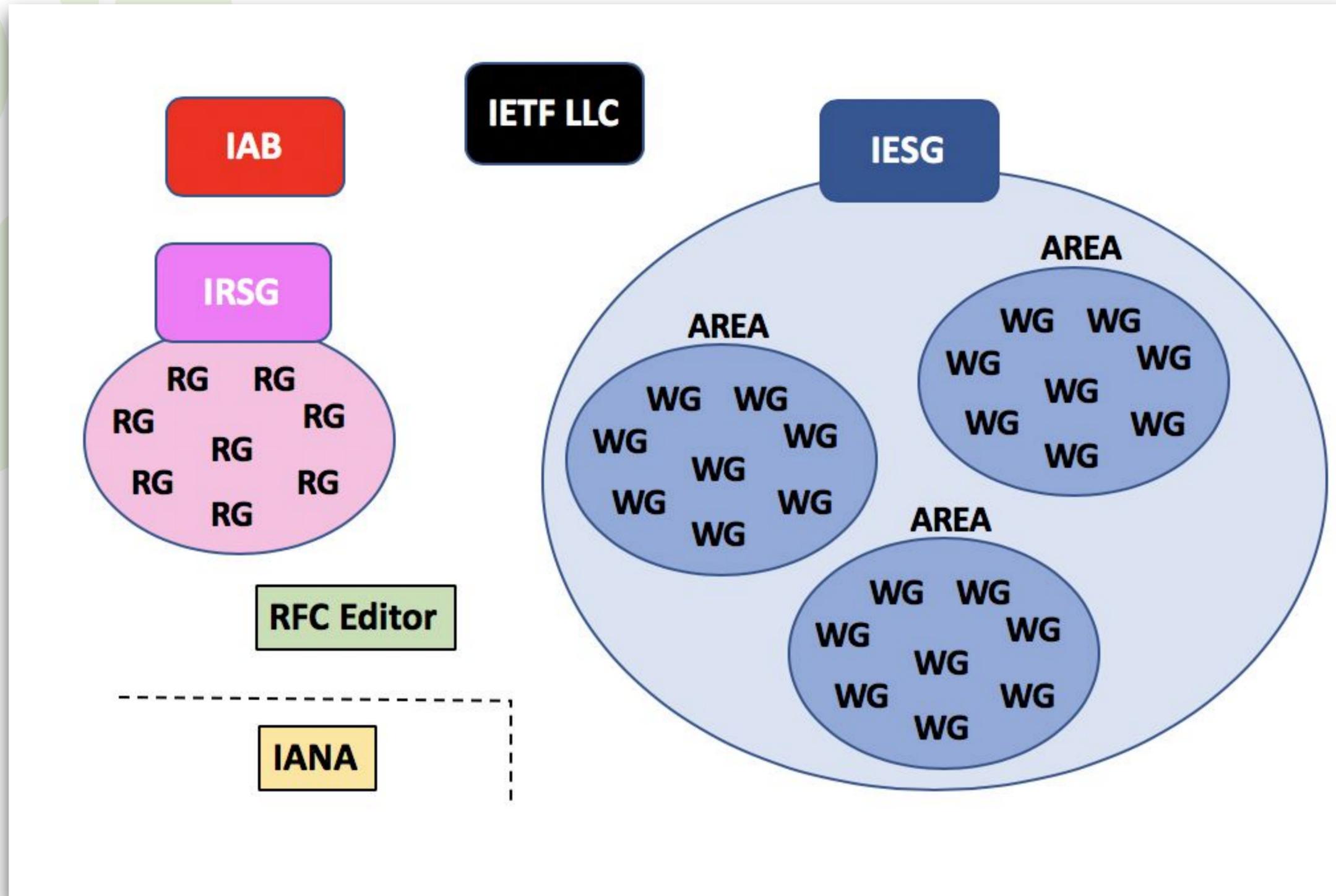
[RFC 3935]

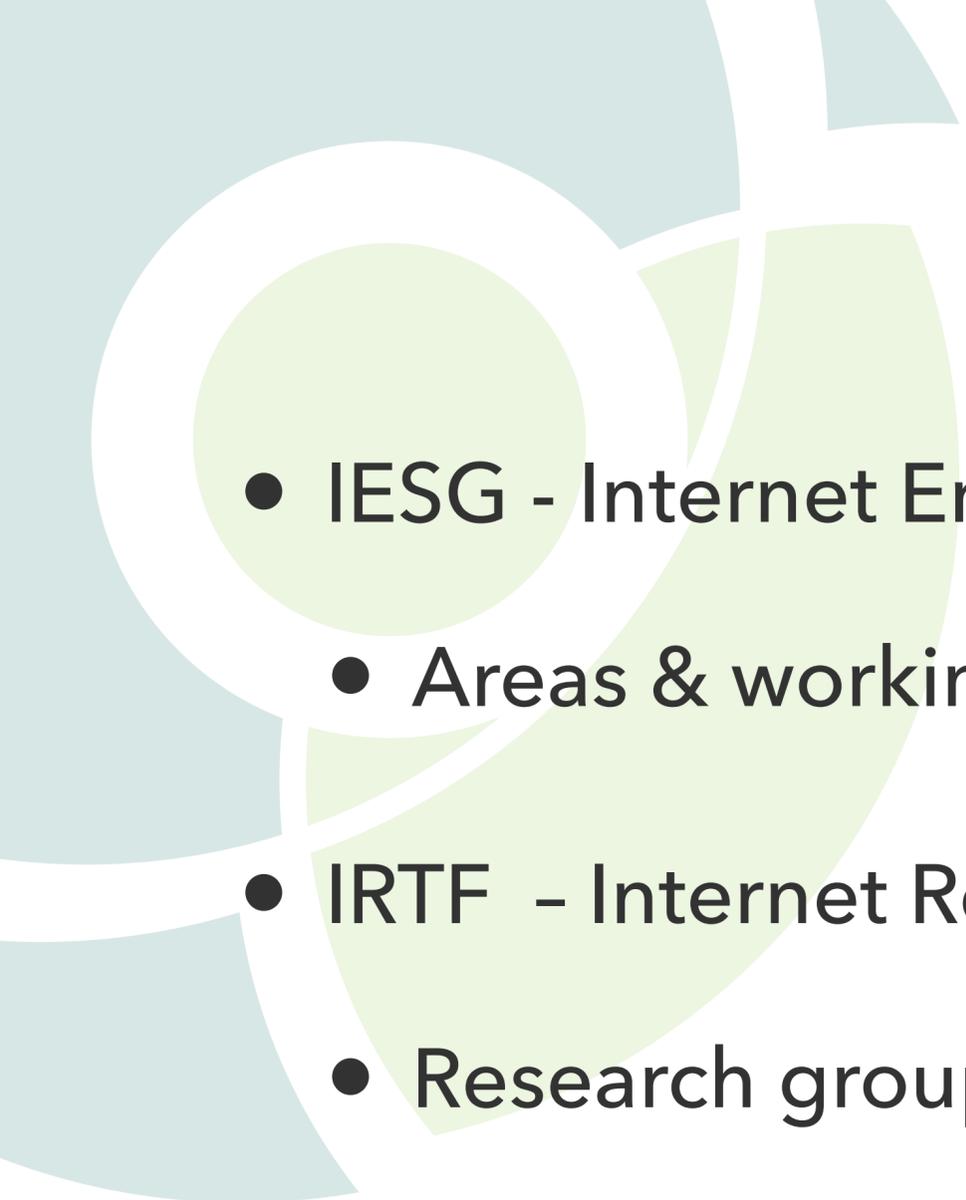


Humble Beginnings

- First IETF meeting held in January 1986
 - 21 attendees
- 7th IETF meeting in July 1987
 - 100 attendees
- 49th IETF meeting in December 2000
 - 2810 attendees
- Currently
 - 3 meetings per year
 - around 1200 attendees

The IETF Organisation Map





Alphabet Soup

- IESG - Internet Engineering Steering Group
 - Areas & working groups here!
- IRTF - Internet Research Task Force
 - Research groups here!
- IAB - Internet Architecture Board
- IETF LLC - IETF Administrative LLC

Who Does What?

- IESG
 - Responsible for technical management of IETF activities and the Internet standards process
- IRTF
 - A parallel organisation focussed on longer-term research topics for the Internet
- IAB
 - Provides oversight of the Internet architectures and the standards process
- IETF LLC
 - Provides the corporate legal home for the IETF, the IAB and the IRTF
 - Provides fiscal and administrative support

IETF Areas

Applications and Real-Time (ART)	<ul style="list-style-type: none">• Application protocols and architectures• Real-time (communication) and non-real-time	31 WGs
Transport (TSV)	<ul style="list-style-type: none">• Mechanisms related to data transport on the Internet<ul style="list-style-type: none">- Includes congestion control	10 WGs
Routing (RTG)	<ul style="list-style-type: none">• Routing and signaling protocols	23 WGs
Internet (INT)	<ul style="list-style-type: none">• IPv4/IPv6, DNS, DHCP, mobility	17 WGs
Operations and Management (OPS)	<ul style="list-style-type: none">• Network management• Operations: IPv6, DNS, security, routing	14 WGs
Security (SEC)	<ul style="list-style-type: none">• Security protocols and mechanisms	25 WGs
General (GEN)	<ul style="list-style-type: none">• Activities focused on supporting and updating IETF processes	2 WGs

122 WGs in total

IETF Leadership

- IETF chair, IESG and IAB members are selected by the NomCom
 - term is 2 years, no limit to number of terms
 - NomCom members are selected through random process (participants attended 3 out of the last 5 meetings)
- WG chairs are appointed by the Area Director (member of the IESG)



The IETF Standards Process

How We Work

- Working groups
 - primary mechanism for development of IETF standards and recommendations
 - generally expected to be short-lived in nature, some providing ongoing improvements
- Email lists
 - discussion list focussed to a specific WG
- Meetings and events (like Hackathons)
 - most work done online
 - meetings give opportunities to advance work



How We Work (cont'd)

- Running code
 - *We believe in rough consensus and running code*
 - IETF Hackathons to facilitate running code
- Online tools
 - datatracker, the day-2-day front-end to IETF database
 - Internet-Draft submission tool
 - online meeting tools, e.g. scheduling, agenda, meeting platform (Meetecho)
 - IPR tool
- BoFs - Birds of a Feather (flock together)



The Standards Process

- Goals of Internet standards process are
 - technical excellence
 - clear & concise, and easily understood documentation
 - prior implementation and testing
 - openness and fairness
 - timeliness



The Standards Process in Steps

- Individual Internet-Draft submission
 - anyone can submit an Internet-Draft
- WG adoption of an Internet-Draft
 - document undergoes a period of development and several iterations of review
 - document gets adopted by a WG
 - continued document development and iterations of review
 - after establishing *rough consensus*: Working Group Last Call!



The IETF and Consensus

- IETF Mantra

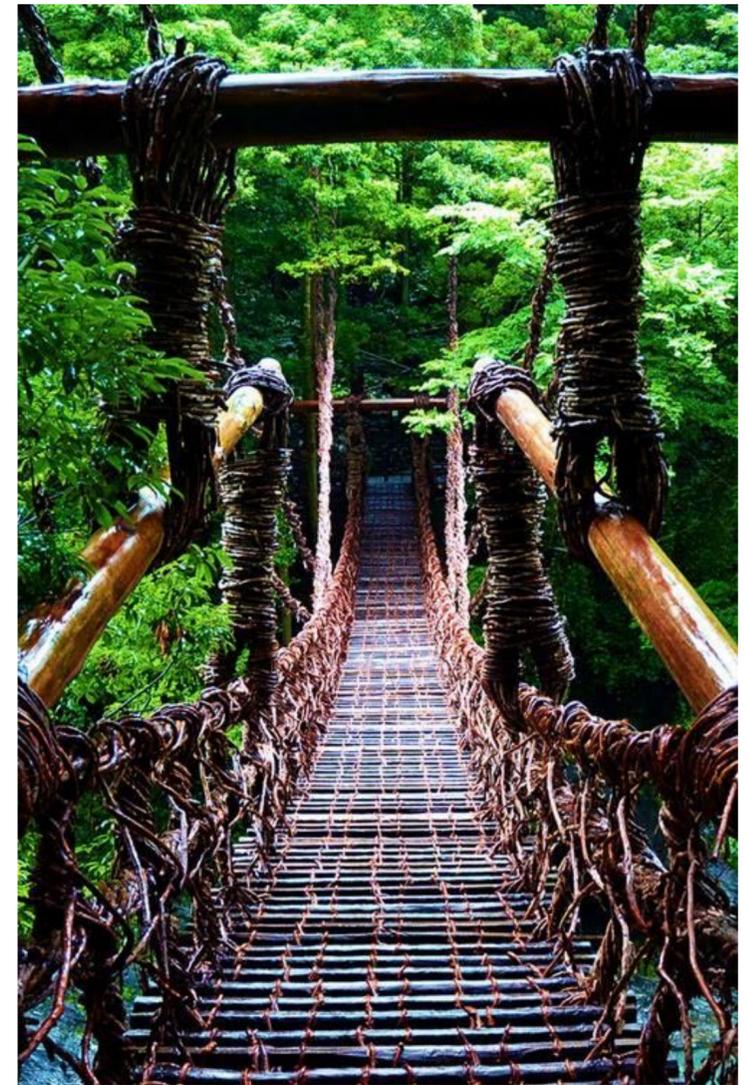
“We reject kings, presidents and voting. We believe in rough consensus and running code”

- Rough consensus is achieved when all issues are addressed, but not necessarily accommodated [RFC 7282]
- Dissenting opinions are heard, but are not controlling
- Humming: a way of measuring consensus that is not voting
- Session chair is responsible for building consensus
- WG mailing list consensus has to be taken into account

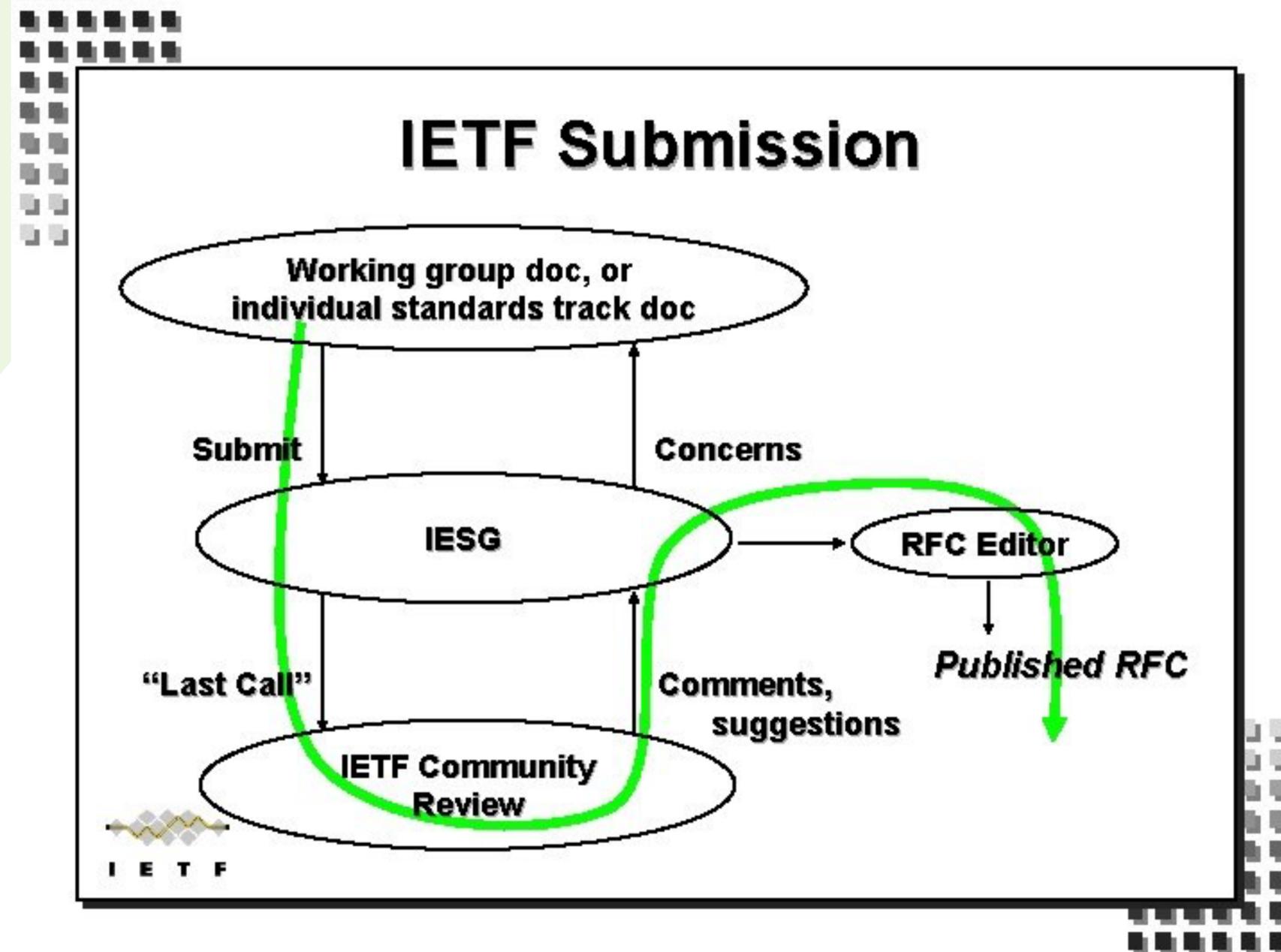


The Standards Process in Steps (2)

- IESG process from Internet-Draft to RFC
 - issue an IETF Last Call
 - IESG review (taking into account IETF Last Call)
 - approval by individual IESG members (on datatracker)
 - announcement on IETF mailing list
- RFC Editor
 - editorial changes for readability and consistency



The IETF Standards Process in a Picture



RFC Index

Num Information

- [0001](#) **Host Software** S. Crocker [April 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0001)
- [0002](#) **Host software** B. Duvall [April 1969] (TXT, PDF, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0002)
- [0003](#) **Documentation conventions** S.D. Crocker [April 1969] (TXT, HTML) (Obsoleted-By [RFC0010](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0003)
- [0004](#) **Network timetable** E.B. Shapiro [March 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0004)
- [0005](#) **Decode Encode Language (DEL)** J. Rulifson [June 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0005)
- [0006](#) **Conversation with Bob Kahn** S.D. Crocker [April 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0006)
- [0007](#) **Host-IMP interface** G. Deloche [May 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0007)
- [0008](#) **ARPA Network Functional Specifications** G. Deloche [May 1969] (PDF, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0008)
- [0009](#) **Host Software** G. Deloche [May 1969] (PDF, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0009)
- [0010](#) **Documentation conventions** S.D. Crocker [July 1969] (TXT, HTML) (Obsoletes [RFC0003](#)) (Obsoleted-By [RFC0016](#)) (Updated-By [RFC0024](#), [RFC0027](#), [RFC0030](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0010)
- [0011](#) **Implementation of the Host - Host Software Procedures in GORDO** G. Deloche [August 1969] (TXT, PDF, HTML) (Obsoleted-By [RFC0033](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0011)
- [0012](#) **IMP-Host interface flow diagrams** M. Wingfield [August 1969] (TXT, PS, PDF, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0012)
- [0013](#) **Zero Text Length EOF Message** V. Cerf [August 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0013)
- 0014 Not Issued
- [0015](#) **Network subsystem for time sharing hosts** C.S. Carr [September 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0015)
- [0016](#) **M.I.T** S. Crocker [August 1969] (TXT, HTML) (Obsoletes [RFC0010](#)) (Obsoleted-By [RFC0024](#)) (Updated-By [RFC0024](#), [RFC0027](#), [RFC0030](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0016)
- [0017](#) **Some questions re: Host-IMP Protocol** J.E. Kreznar [August 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0017)
- [0018](#) **IMP-IMP and HOST-HOST Control Links** V. Cerf [September 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0018)
- [0019](#) **Two protocol suggestions to reduce congestion at swap bound nodes** J.E. Kreznar [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0019)
- [0020](#) **ASCII format for network interchange** V.G. Cerf [October 1969] (TXT, PDF, HTML) (Also [STD0080](#)) (Status: INTERNET STANDARD) (Stream: Legacy) (DOI: 10.17487/RFC0020)
- [0021](#) **Network meeting** V.G. Cerf [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0021)
- [0022](#) **Host-host control message formats** V.G. Cerf [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0022)
- [0023](#) **Transmission of Multiple Control Messages** G. Gregg [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0023)
- [0024](#) **Documentation Conventions** S.D. Crocker [November 1969] (TXT, HTML) (Obsoletes [RFC0016](#)) (Updates [RFC0010](#), [RFC0016](#)) (Updated-By [RFC0027](#), [RFC0030](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0024)
- [0025](#) **No High Link Numbers** S.D. Crocker [October 1969] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0025)
- 0026 Not Issued
- [0027](#) **Documentation Conventions** S.D. Crocker [December 1969] (TXT, HTML) (Updates [RFC0010](#), [RFC0016](#), [RFC0024](#)) (Updated-By [RFC0030](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0027)
- [0028](#) **Time Standards** W.K. English [January 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0028)
- [0029](#) **Response to RFC 28** R.E. Kahn [January 1970] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0029)
- [0030](#) **Documentation Conventions** S.D. Crocker [February 1970] (TXT, HTML) (Updates [RFC0010](#), [RFC0016](#), [RFC0024](#), [RFC0027](#)) (Status: UNKNOWN) (Stream: Legacy) (DOI: 10.17487/RFC0030)
- [0031](#) **Binary Message Forms in Computer** D. Bobrow, W.R. Sutherland [February 1968] (TXT, HTML) (Status: UNKNOWN) (Stream: Legacy) (DOI:



Demographics of the IETF

Participants and Stakeholders in the IETF

- IETF participants are (self-selected) individuals
 - not governments, organisations, or companies, but ...
 - representatives of governments, organisations (ngo's) or companies are active
- Governments/governmental organisations
 - security & stability, like DNSSEC, RPKI or encryption standards
- Organisations/NGOs
 - privacy, human rights, inclusiveness in process & standards
- Companies
 - push technology, e.g. in routing standards, DNS-over-HTTPS or QUIC
- ...

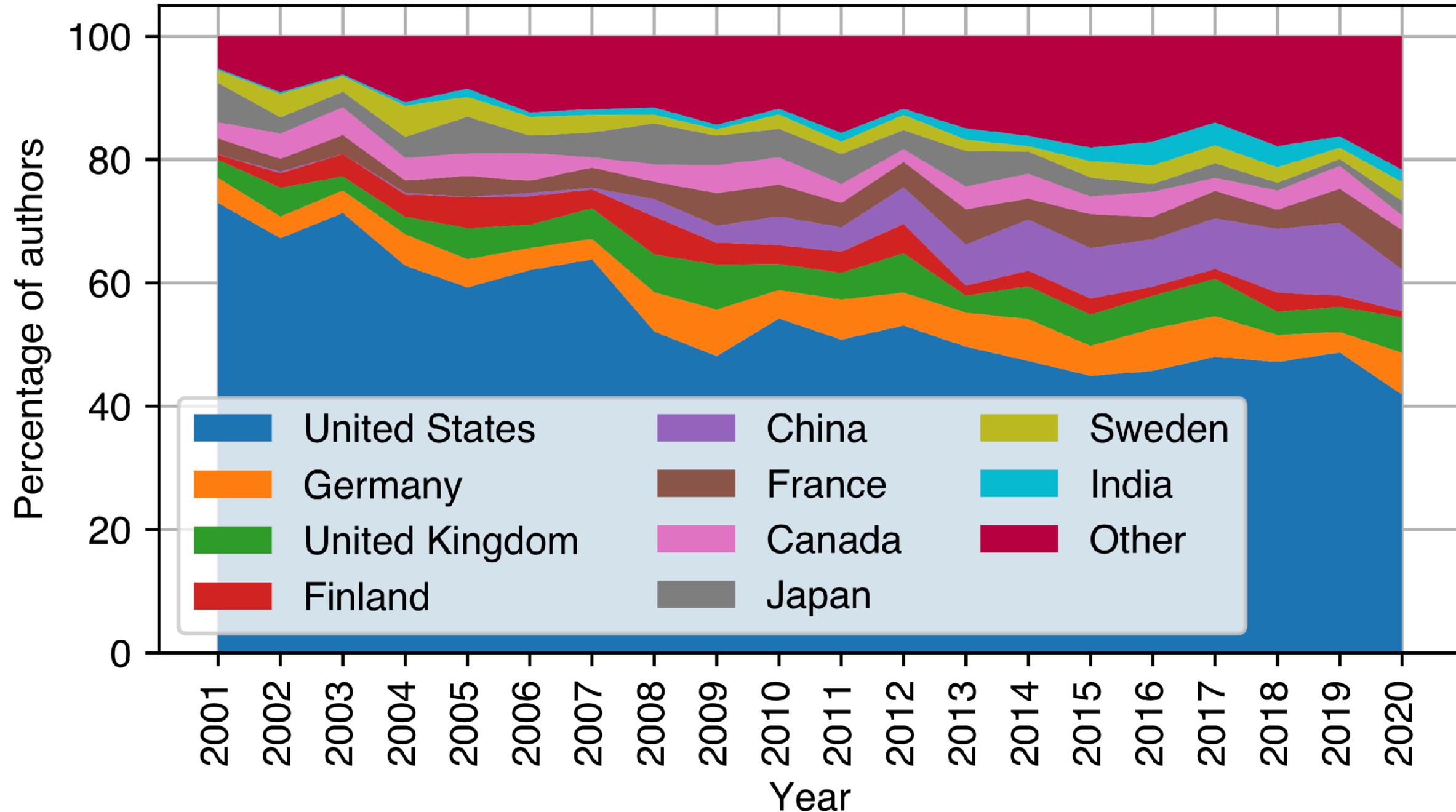


Netherlands and Internet Standards

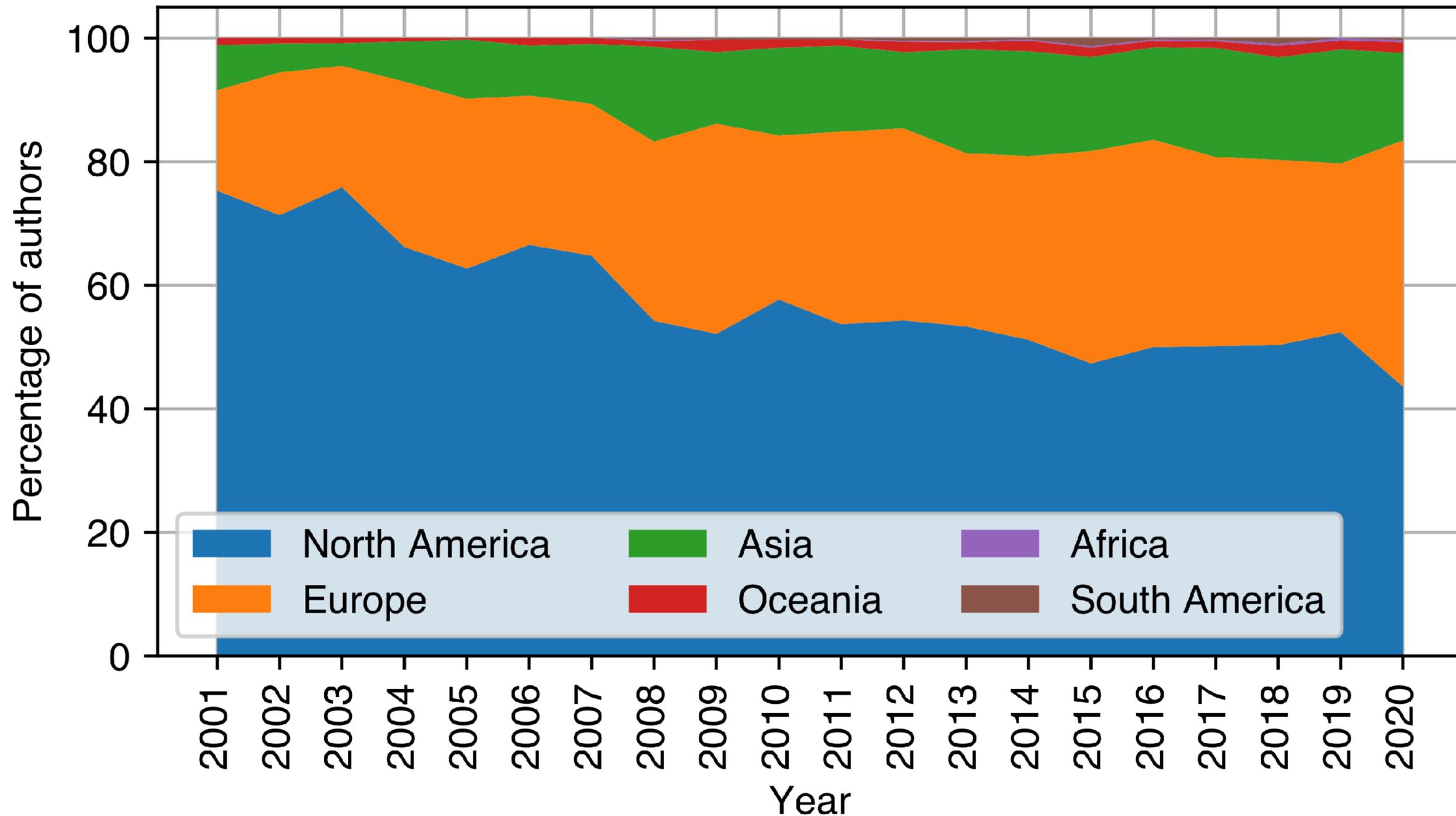
- Netherlands is well represented in the IETF
 - by individuals, not by nation
 - some areas more than others, e.g. DNS is called the Dutch Naming System
- Impact on Internet standards adoption
 - Forum Standaardisatie
 - Platform Internet Standaarden



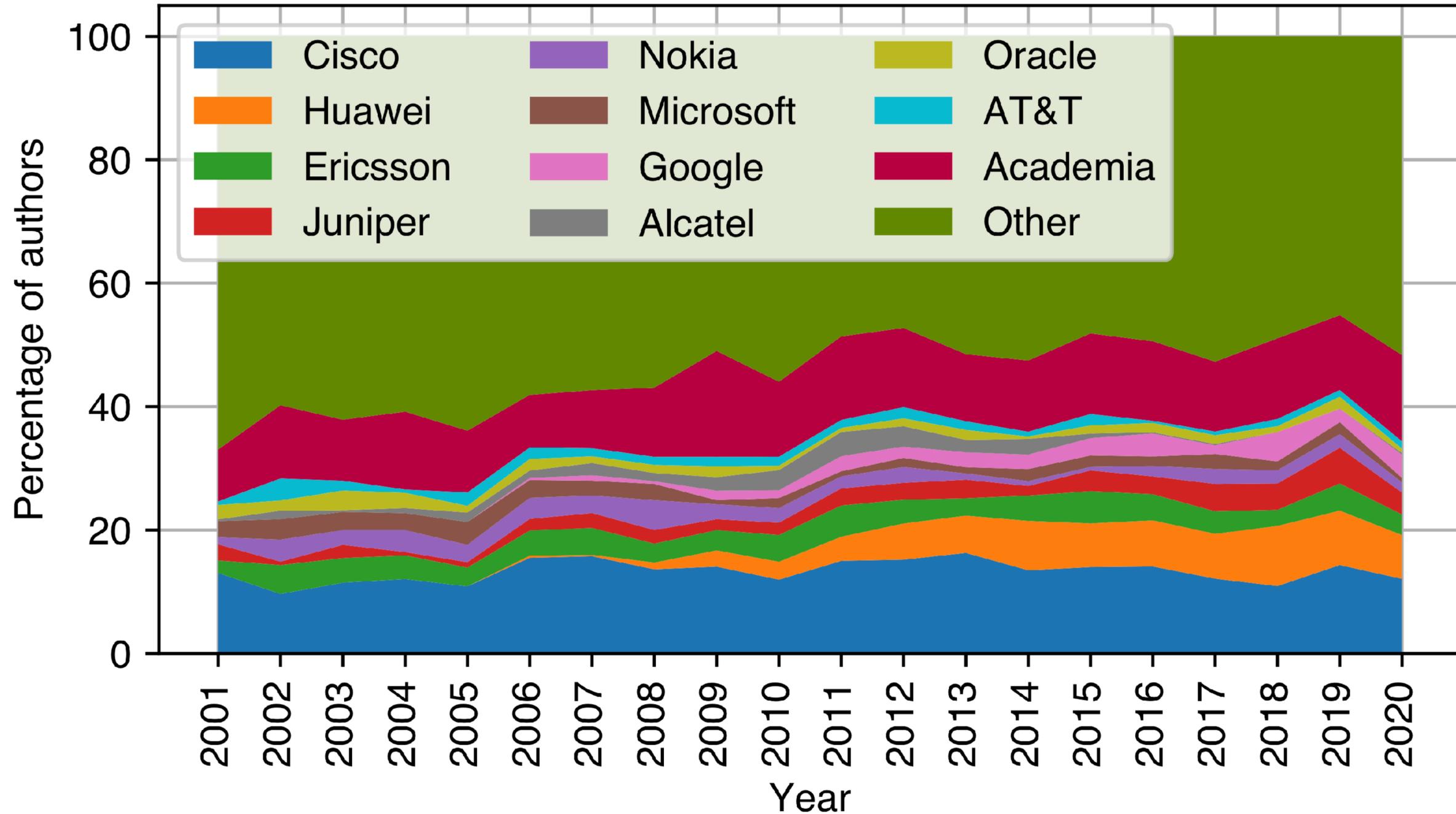
Fraction IETF Authors per Country



Fraction IETF Authors per Continent



Fraction Authors per Organisation



HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)



<https://xkcd.com/927>

Questions?