

From Research to Internet Standards

NOKIA

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**Standardization Workshop
Future Internet Conference Week
Ghent, Belgium, 2010-12-15**

Nokia Research Center



Who cares?



Researchers, why should **you** care about standards?

- If you're researching Internet-related topics, **where do you learn what the real current issues are?**
- Hint: wireless ATM is not one of them
- You need to talk to operators, vendors, registrars, policy makers, regulators, etc.
- (Assuming you are interested in research that could have an actual impact)
- Where is it easy to meet these folks?
- **Standards bodies** + operator fora

But don't forget to **think** for yourself

- You will talk to many folks who aren't researchers
- Their **motivations are different** than yours
 - Often very short-term agendas
 - Few can abstract out to principles
 - Worried about the symptoms, not the causes
 - If all you have is a hammer, everything starts to look like a nail
 - Many are there to make money (or keep others from taking theirs)
- **Think hard** if the “problems” you learn about pass muster
 - c.f. software engineering requirement documents

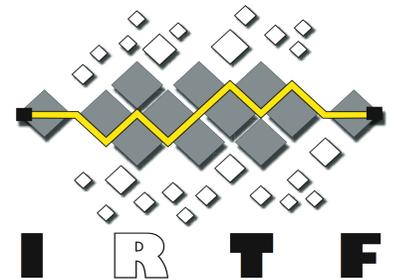
Still.. go!

- If you're interested in what the real problems are, you'll get a **good understanding** by attending these fora
- If you're interested in fixing some of them, you'll need to **participate** more regularly
- **Papers don't get deployed**
- For **Internet** and "Future" Internet stuff – due to SDO change control agreements – that means: **participate in the IETF**
- (3GPP, ITU-T, ETSI for special topics)



IETF participation takes **time**

- Standardization is very different from “fire & forget” academic publication/presentation venues
- The **time commitment** is substantial, both in terms of email discussion and meeting travel
- You will need to convince a diverse set of stakeholders of the value of your proposal
- **Theoretically optimal ≠ practically optimal**
- Business aspects and deployment incentives are **critical** (papers don't get deployed)
- Don't forget about the research arm – the **IRTF**



Need **additional** motivation?

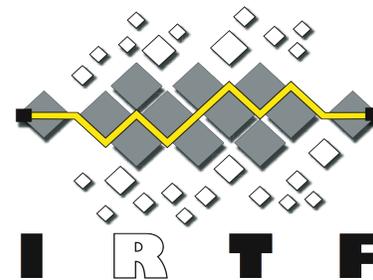
- If you're on an academic career path, standardization is unlikely to get you tenure
 - But it doesn't often hurt you either
- You will meet likeminded people to collaborate with
 - And some of them have substantial budgets
- If you're a junior researcher not on the academic career path, getting positively noticed in these fora can lead to an industry career...

IETF in a nutshell



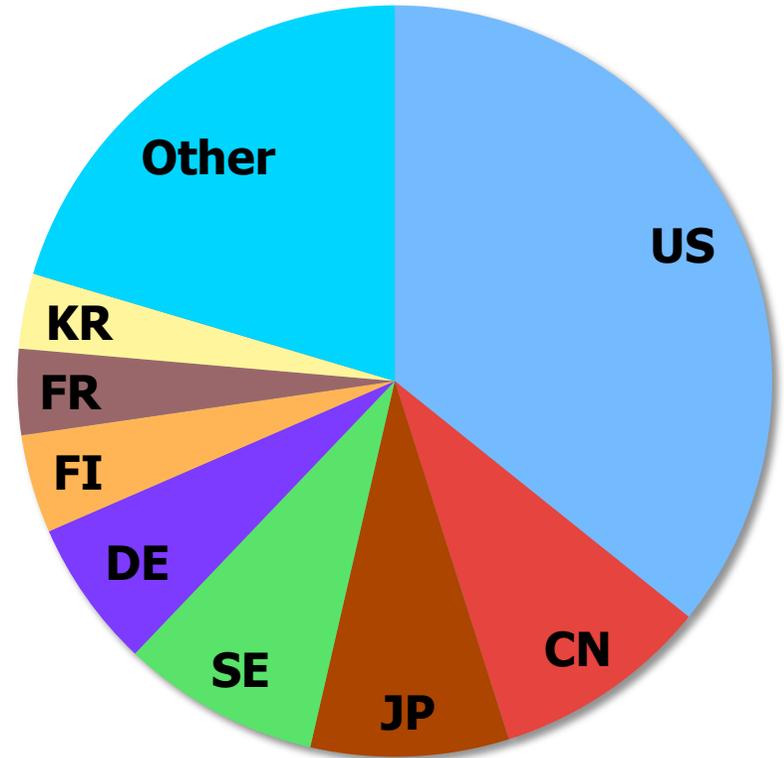
Internet standards = IETF standards

- The **IETF** is an **open, diverse** and **international** community
- Network designers, operators, vendors, researchers, etc.
- **Common goal:** evolution of the Internet architecture and protocols & smooth operation of the Internet
- Participatory culture; open to anyone: **people, not companies**
- Produces **Internet Standards** (and other documents)
- It has a research arm – the **IRTF**



IETF by numbers

- **1-2000 people** at 3 meetings/year
 - from ca. **40-50 different countries**
 - Many, many more on mailing lists
- **~120 working groups (WGs)**
- 8 Areas with 15 area directors (ADs)
- More than **6000 RFCs** published
- More than **50000 Internet-Draft** revisions submitted
- **IRTF** = ~12 research groups (RGs)



Participants at IETF-75
Stockholm, July 2009
1084 total, 50 countries

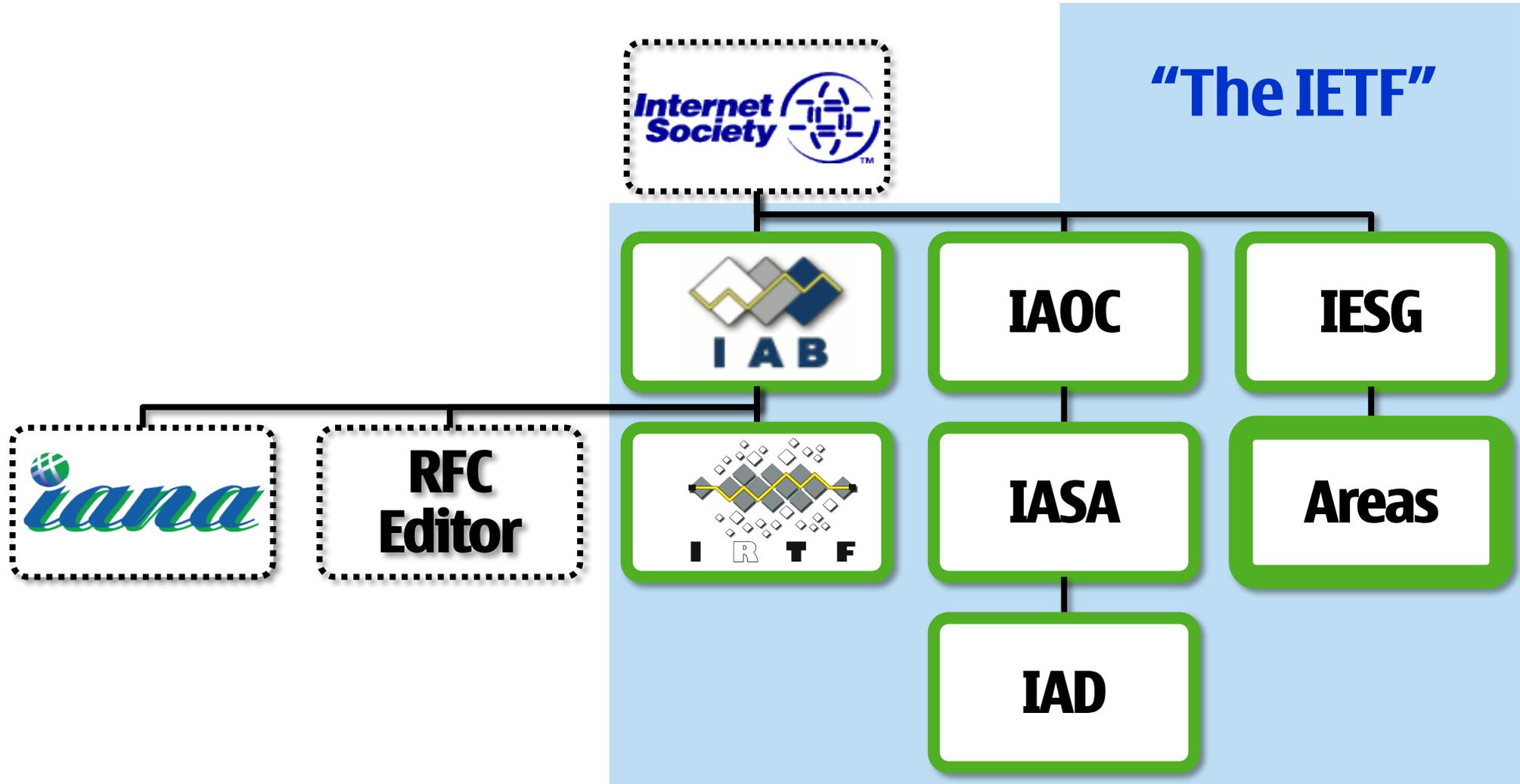
IETF standardization considerations

- **Open process** to produce open Internet standards
- **Global standards** for a global Internet
- Alignment with Internet **architectural principles**
- Maximum **interoperability**
- Maximum **scalability**
- Improved Internet **security and privacy**

IETF organizational structure

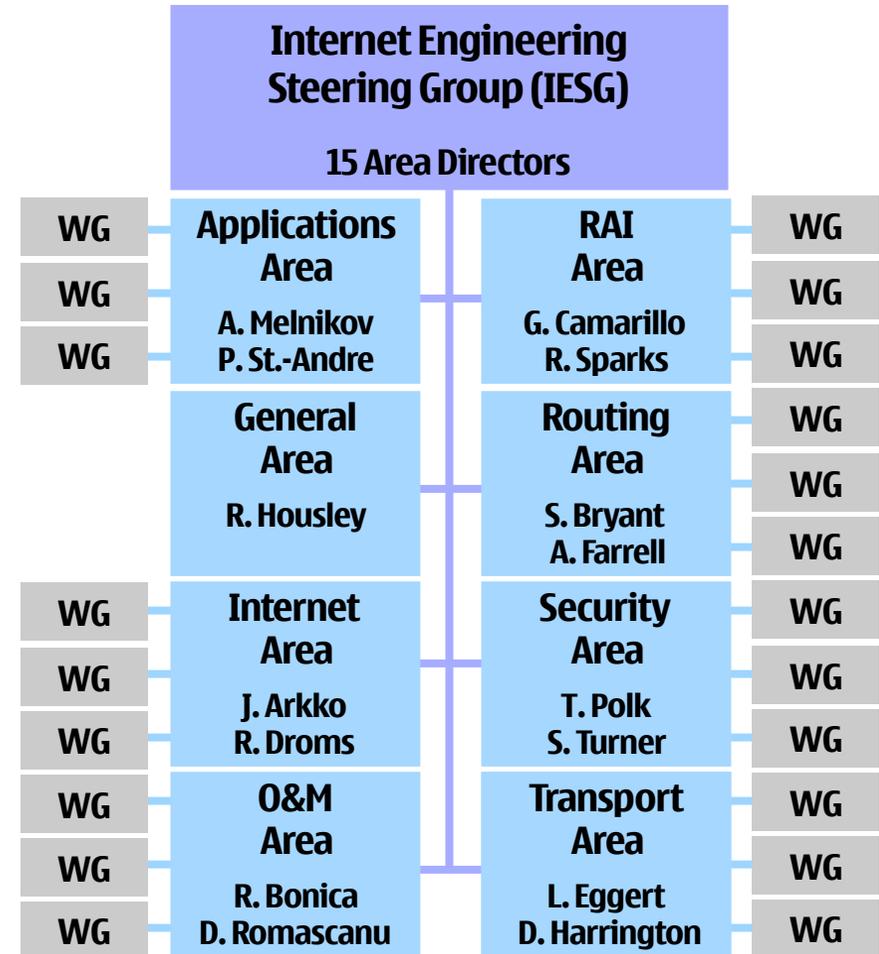


Top-level organizational view

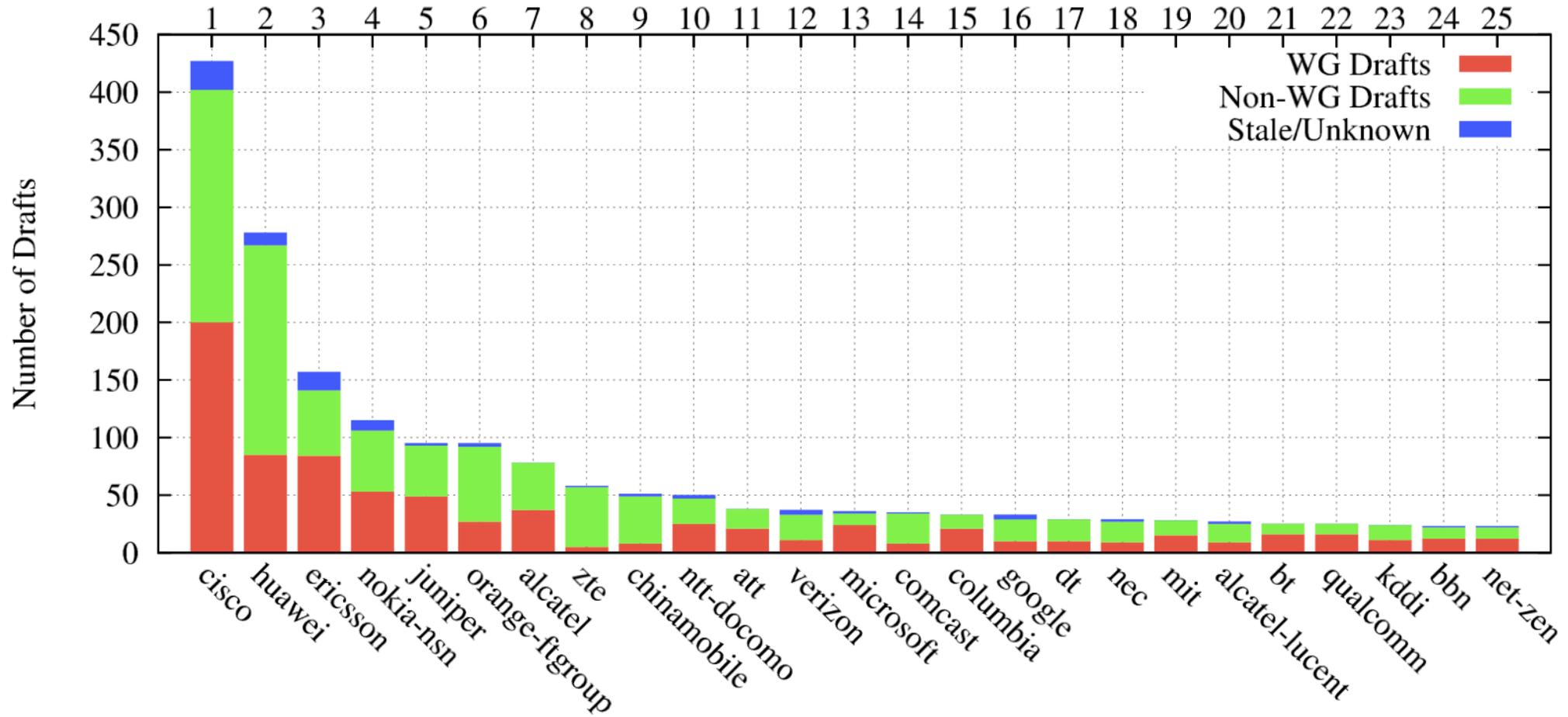


Top-level IETF & area structure

- IETF is structured into **8 areas**
 - Each with **area directors** (ADs)
- Areas are structured into **working groups** (WGs)
 - Each with **WG chairs**
- Internet Engineering Steering Group (**IESG**) = all ADs
 - Approves all Internet Standards
 - Manages technical work
 - Starts/ends WGs
 - Assigns WG Chairs



Most active IETF organizations



IETF standards & documents



IETF documents – two types

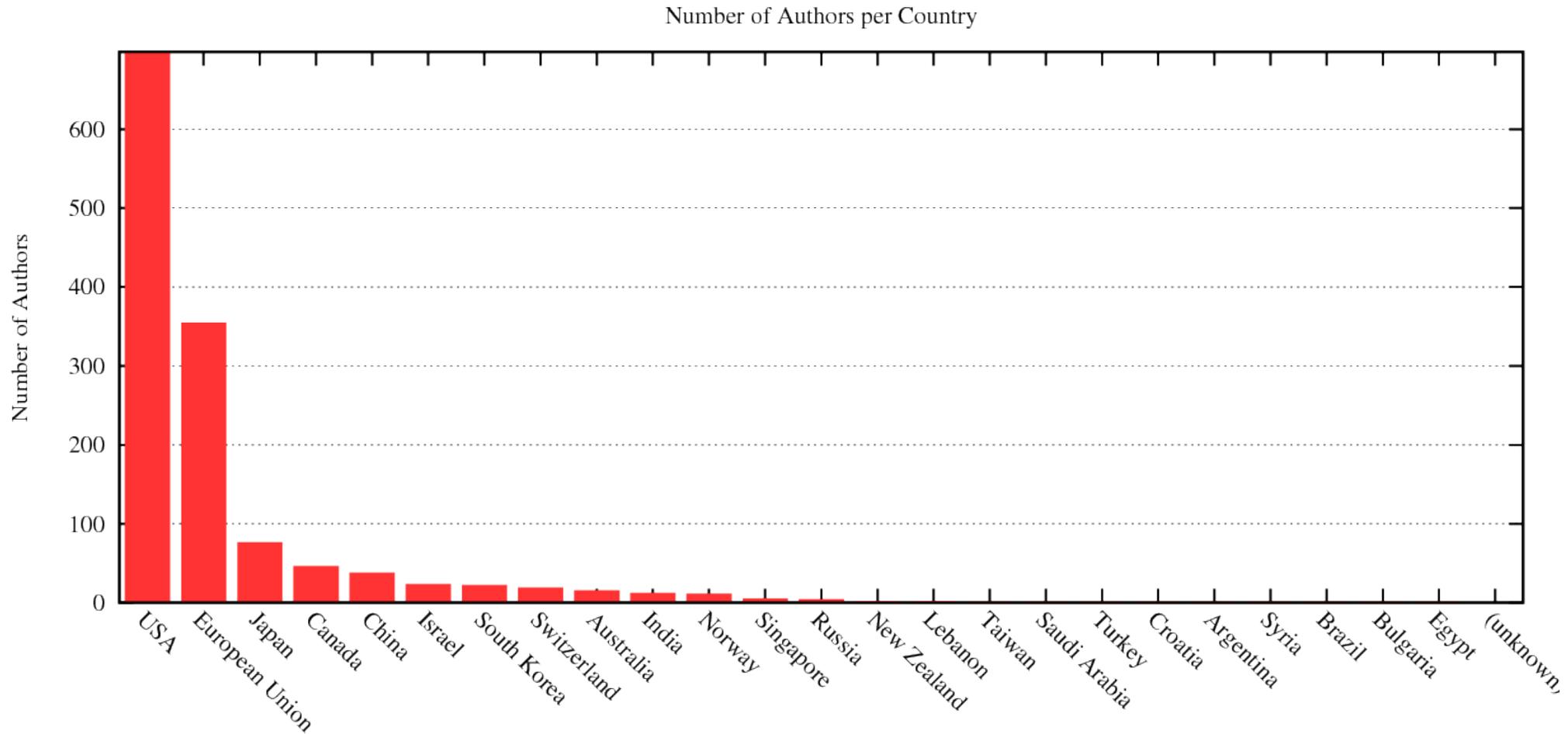
Internet-Draft (I-D)

- Active working documents
- **Not finalized! Not stable!**
- Anyone can submit
 - *draft-yourname-...*
- Only some IDs are WG documents!
 - *draft-ietf-wgname-...*

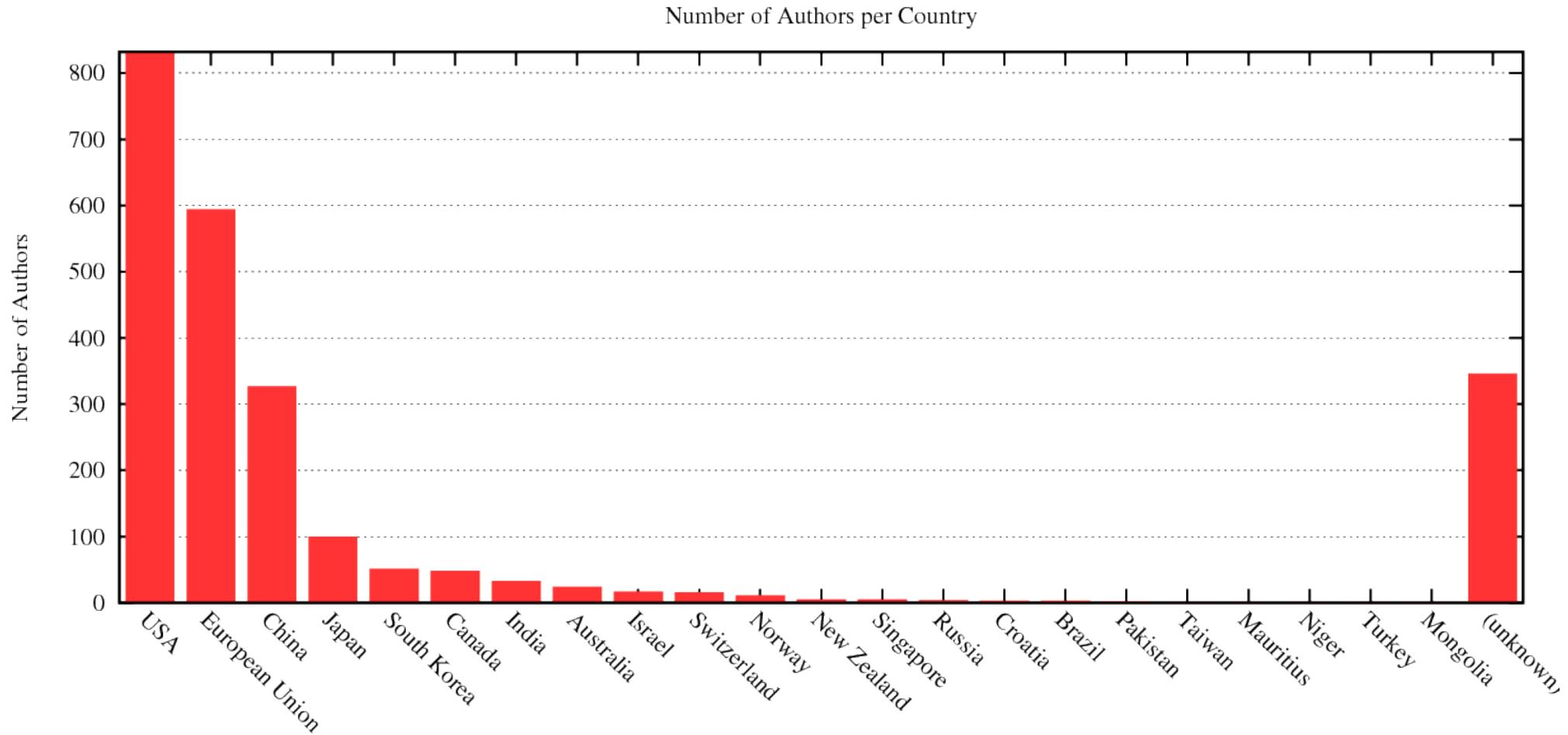
Request For Comment (RFC)

- Archival publications
 - Never change once published
- **Not all RFCs are Internet standards!**
 - Standards track = Proposed/Draft/Full Standard
 - Other types = Informational, Experimental, Best-Current-Practice (BCP)

Origins of authors of recent RFCs



Origins of authors of recent Internet-Drafts



IETF document format

- **English** if the official language
- **ASCII** is the mailing list and document format
- Frequent discussion of alternate formats
 - IETF seen as “behind the times”
 - (Almost) no drawings
 - But no consensus on alternative
- **The current format is still readable after 40+ years...**

```
Network Working Group                                Steve Crocker
Request for Comments: 1                             UCLA
                                                    7 April 1969

                Title:  Host Software
                Author:  Steve Crocker
                Installation:  UCLA
                Date:    7 April 1969
Network Working Group Request for Comment:  1
```

```
Network Working Group                                M. Upadhyay
Request for Comments: 5653                           Google
Obsoletes: 2853                                       S. Malkani
Category: Standards Track                             ActivIdentity
                                                    August 2009
```

Generic Security Service API Version 2: Java Bindings Update

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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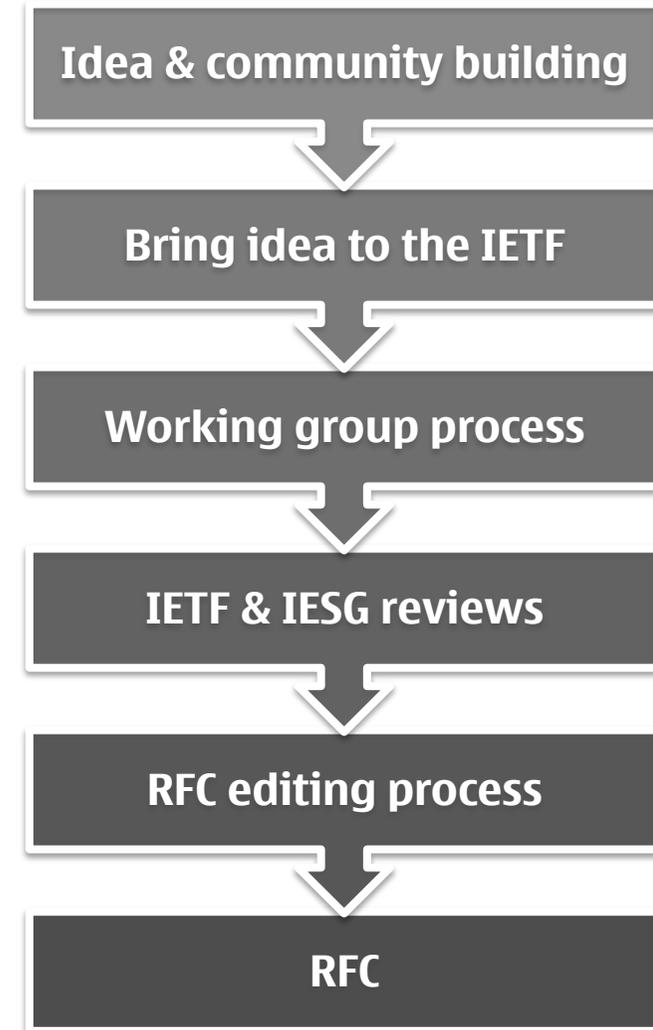
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Bringing new work to the IETF



The IETF takes on work, when...

- **There is a problem** that needs solving
- The **problem fits** one of the IETF areas
- Aligned with Internet **architectural principles**
- **Scope is well defined** and understood
 - Research is complete, and engineering work is needed
- Agreement on specific **deliverables**
- Probability of **timely completion**
- **People** willing to do the work

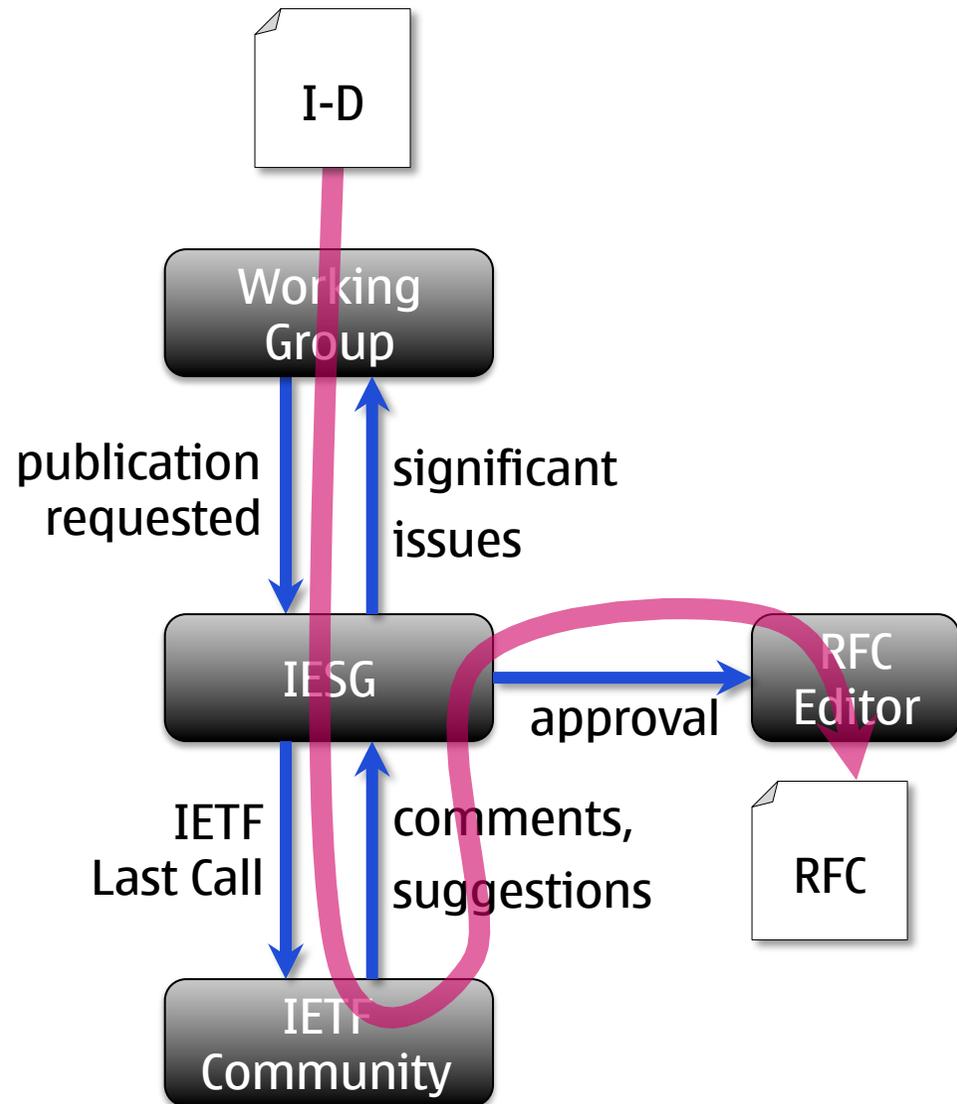


Initiating New IETF Work – Existing WG

- **Check WG charters** & approach chairs to ask their opinion
- **Submit an I-D** to the WG
 - *draft-yourname-wgname-topic-00*
- **Ask for feedback** on I-D on WG mail list
- **Ask for presentation time** during an IETF meeting
- Constructively **incorporate feedback**
 (“revise quickly, revise often”)
- Eventually, **ask to adopt as WG item**
- Continue work in WG (you now become *editor*)

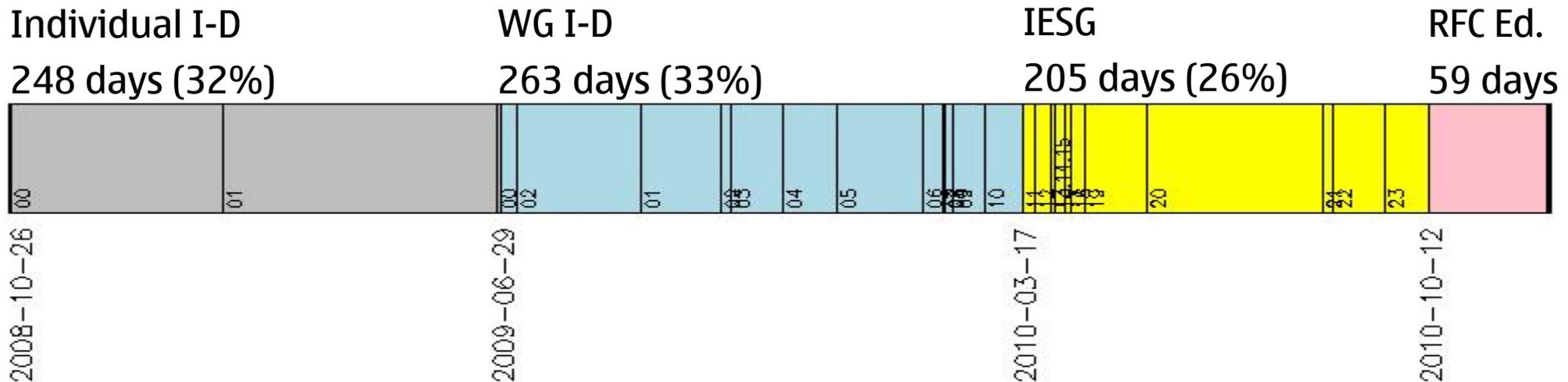
WG, IETF and IESG Process

- Chair establishes **WG consensus**
- Then **requests publication** of I-D as RFC
- I-D **AD review** by responsible AD
- IETF-wide “**Last Call**”
- **IESG review**
 - Last Call comments & own technical review
- **IESG approval**
- **RFC editor** process & publication

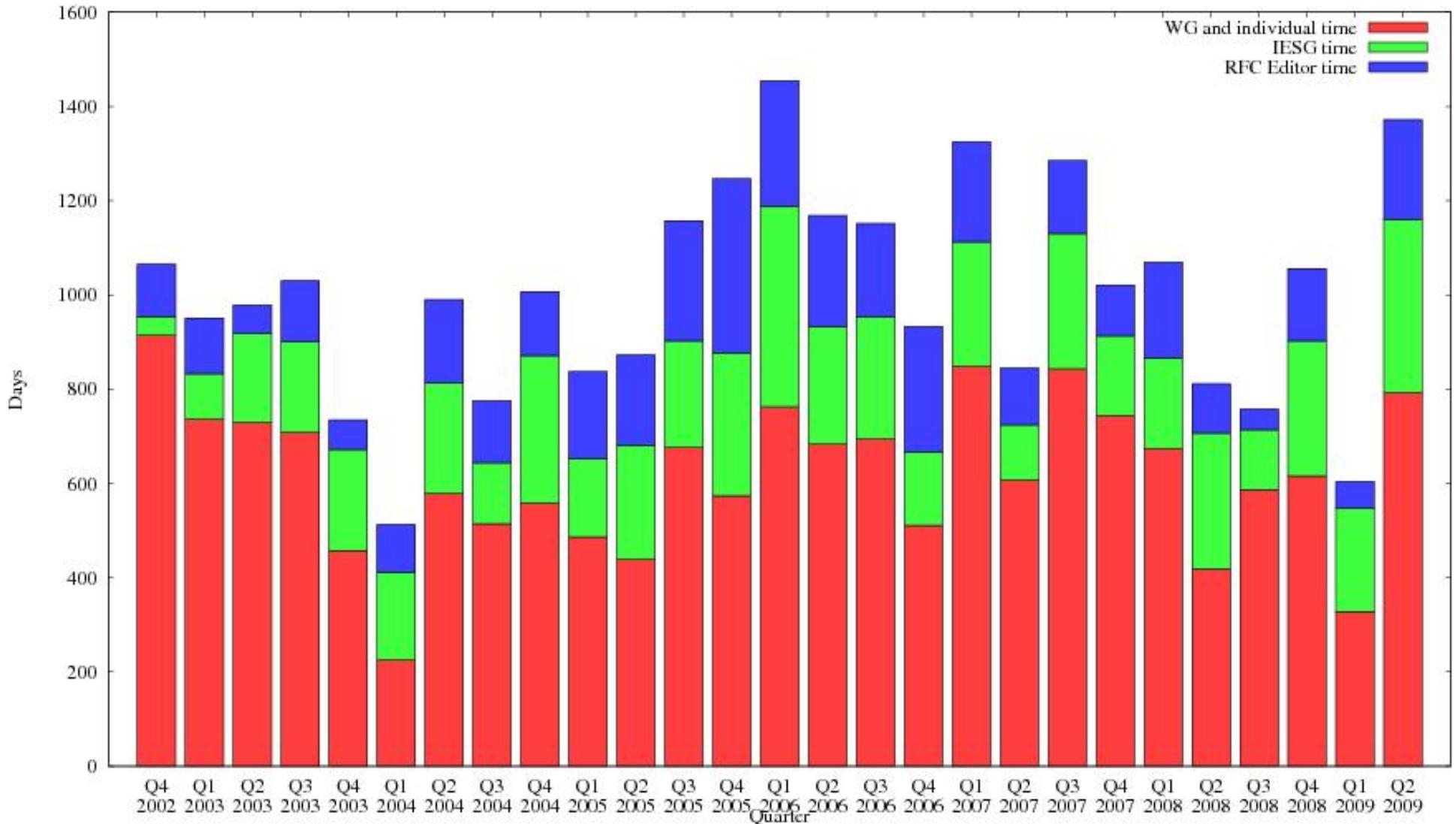


Example: Better tools for IPv6 & IPv4 co-existence

- In **2008**, service providers worried about the ability to deploy IPv6 fast enough (before IPv4 depletion)
- A series of bar, hallway and interim meetings led to a decision to develop some new technology for better co-existence in two WGs
- Results now complete; process took about **2 years**

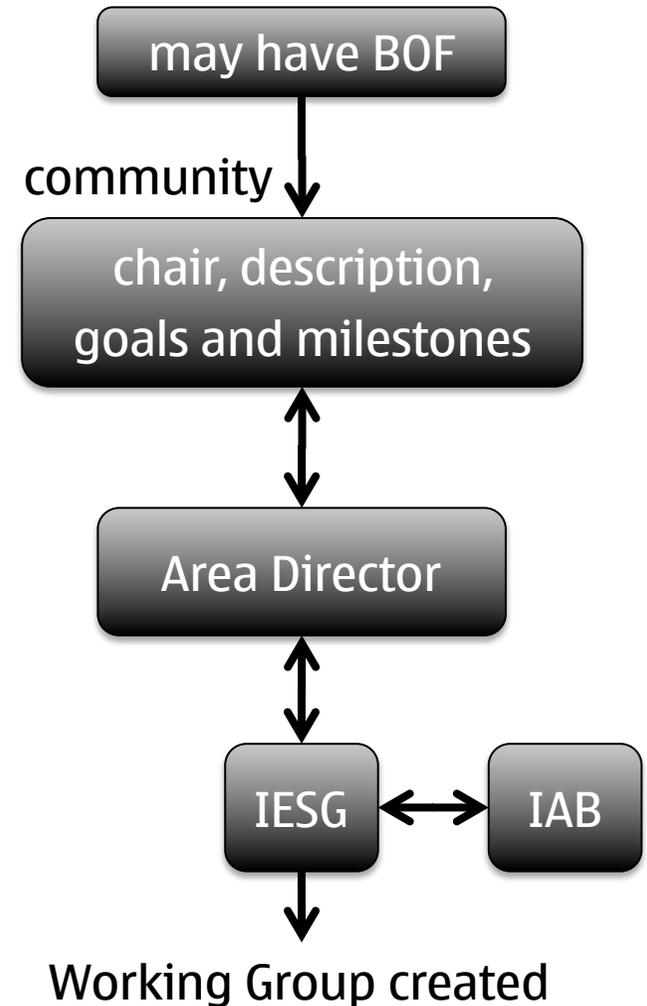


Average time from Internet-Draft to RFC



Initiating New IETF Work – New WG

- **Make sure no existing WG fits!**
- If “small”, can ask AD for **I-D sponsorship**
- Else, likely need to organize a **BOF** (“Birds of a Feather”) session at IETF meeting
- Must **form a community** of interested people around your proposal (!)
- Read RFC5434 & **prepare BOF proposal**
 - Problem statement I-D, open mailing list, draft BOF agenda, etc.
- Ask an AD for **BOF sponsorship**
- BOF determines if a WG may form



Example: PCN (Pre-Congestion Notification)

- Idea presented in TSVWG ca. **2005**
- Bar meeting at IETF-66 in Dallas, TX Mar 2006
- PCN mailing list created Aug 2006
- *draft-chan-pcn-problem-statement-00* posted Sep 2006
- First draft charter posted Sep 2006
- BOF requested Sep **2006**
- BOF held at IETF-67 in San Diego, CA, USA Nov 2006
- Charter went for External Review Feb 2007
- WG chartered Mar **2007**
- WG is ca. 50% done Dec **2010**

Conclusion



Researcher participation in the IETF is **important**

Researcher

- Hear about what the **real** problems are
- Work on **meaningful** open issues – help build the Internet
- Understand what promotes and hinders **deployment**
- Meet potential **collaborators** and **funding** sources
- Have a realistic understanding of the **time commitments**

IETF

- Gains highly skilled, **unbiased** experts
- Use academic results to create **better standards**
- Enable researchers to directly **improve the Internet**
- **Insight into trends** that will impact standards down the road
- Accompany relevant topics in the **IRTF research arm**