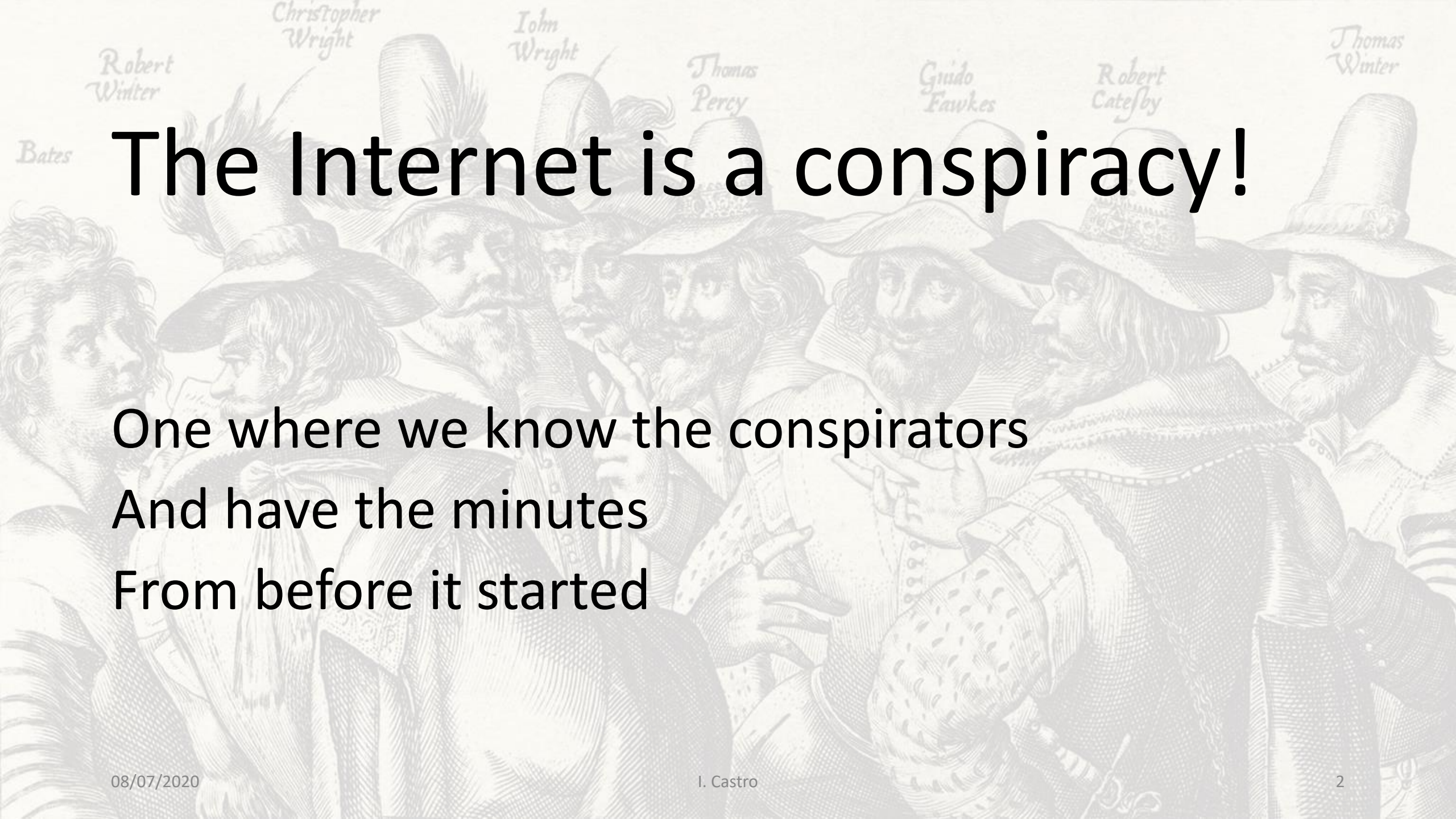


What do 50 Years of RFCs and Standardisation of the Internet tell us?

Ignacio Castro

[+many others]

EPSRC - Streamlining Social Decision Making for Improved Internet Standards



The Internet is a conspiracy!

One where we know the conspirators
And have the minutes
From before it started

Waseed
Iqbal

Stephen
Mcquistin

Colin
Perkins

Stephen
Mcquistin

Guido
Fawkes

Gareth
Tyson

Ignacio
Castro

Bates

The Internet is a conspiracy

One where we
And have the
From before

**Requests
For
Comments
(RFC)**

Waseed
Iqbal

Stephen
Mcquistin

Colin
Perkins

Stephen
Mcquistin

Guido
Fawkes

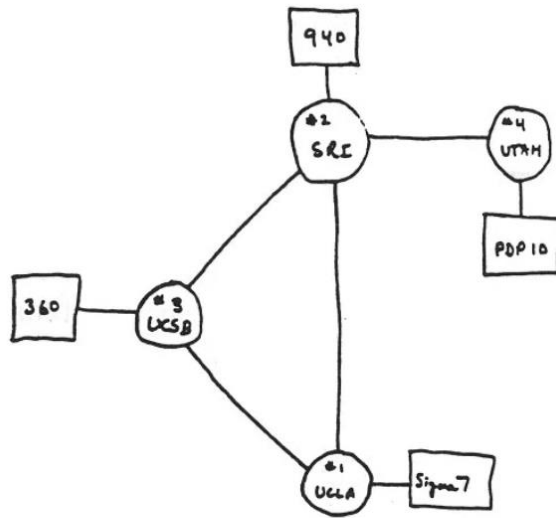
Gareth
Tyson

Ignacio
Castro

Bates

Who is who in the Internet? How to conspire better?

A long time ago, in a continent far away...



THE ARPA NETWORK

DEC 1969

4 NODES

29 OCT 69	21:00	LOADED OP. PROGRAM	CSK
		FOR BEN BARKER	
		BBB	
	22:30	Talked to SRI	CSK
		Host to Host	
		Left op. program	CSK
		running after sending	
		a host dead message	
		to imp.	

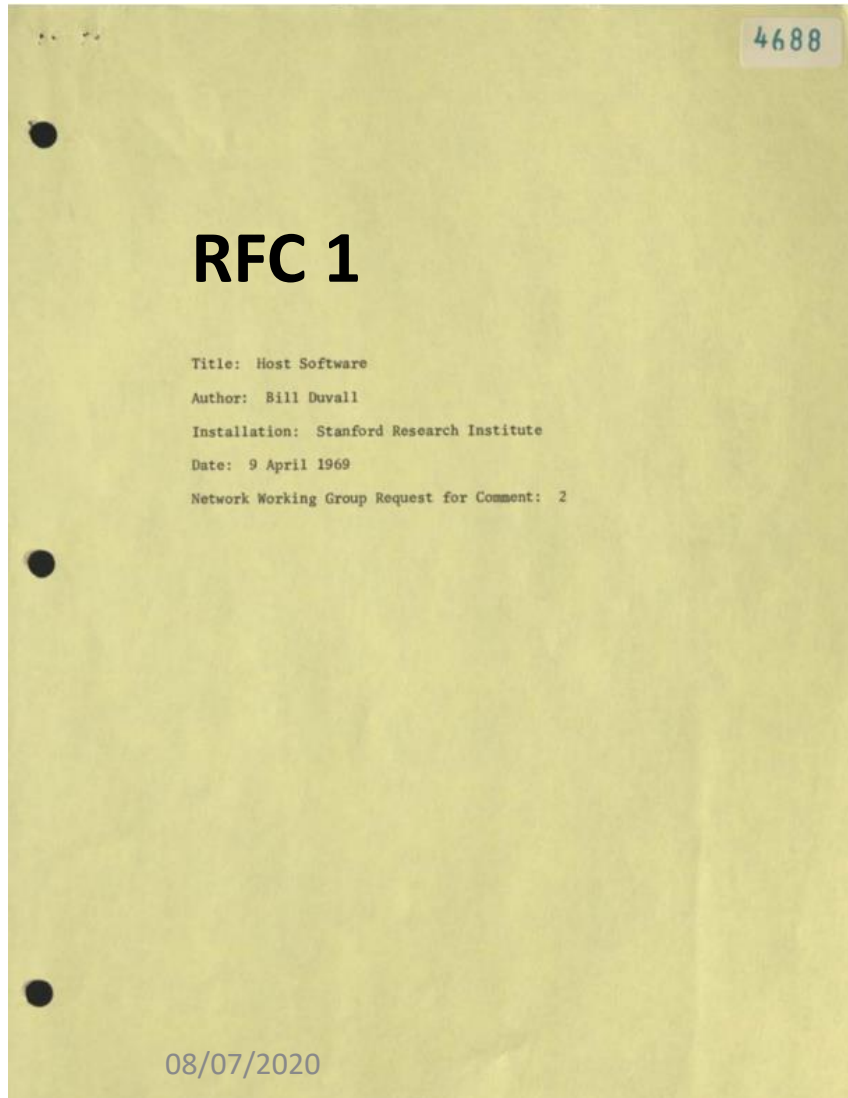
- A packet was sent for first time

But before that happened...

- **Interoperability:** how can different computer systems communicate?

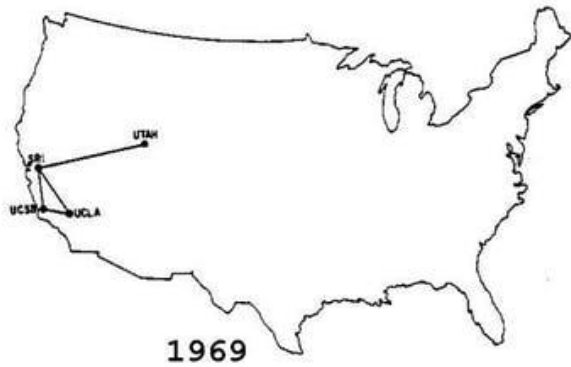
Conspire!

But before that happened...

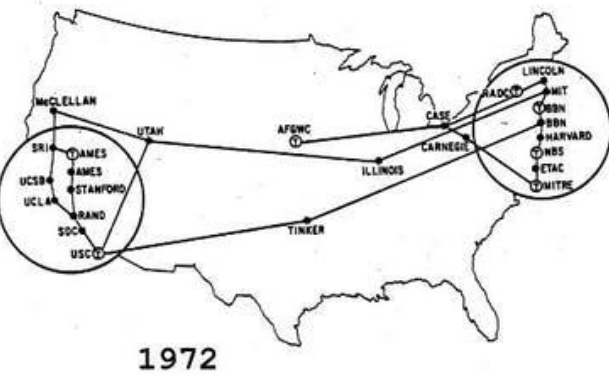
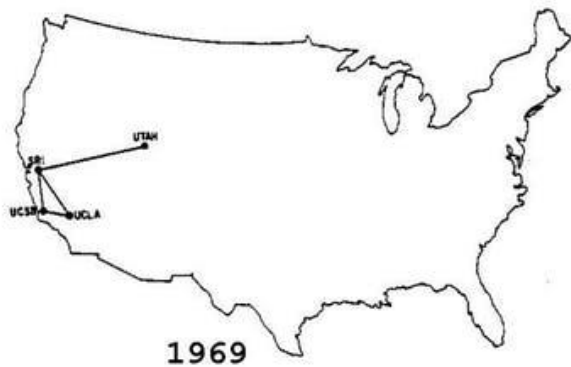


- **Interoperability:** how can different computer systems communicate?
- **Coordination** was required to enable interoperability
- **Request For Comments (RFCs):** informal documents to discuss “networking ideas” and coordinate the development of the ARPANET

From ARPANET to INTERNET: interoperability



From ARPANET to INTERNET: interoperability



Comments on Internet Protocol and TCP

IEN # 2

RFC 760

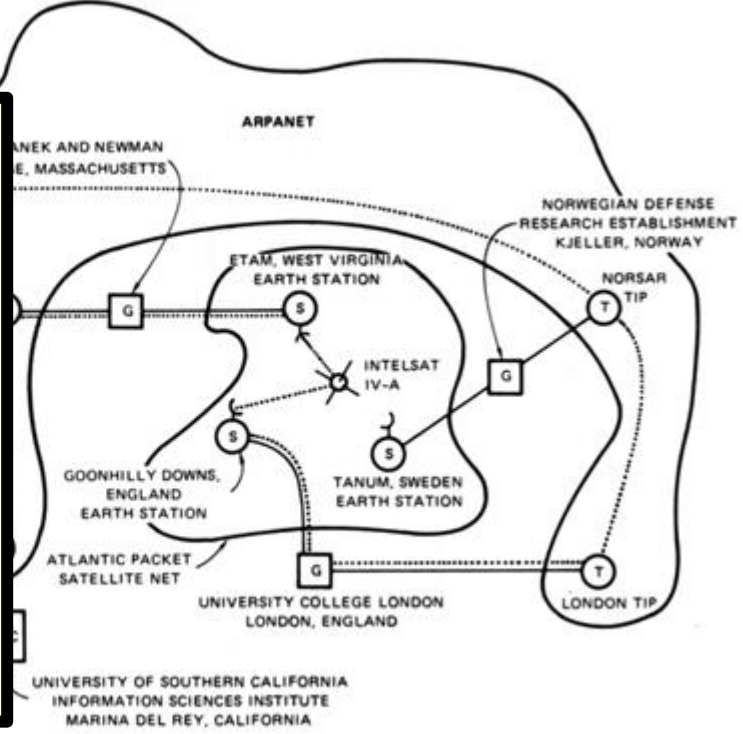
Jon Postel
ISI
15 August 1977

2.3.3.2 Comments on Internet Protocol and TCP

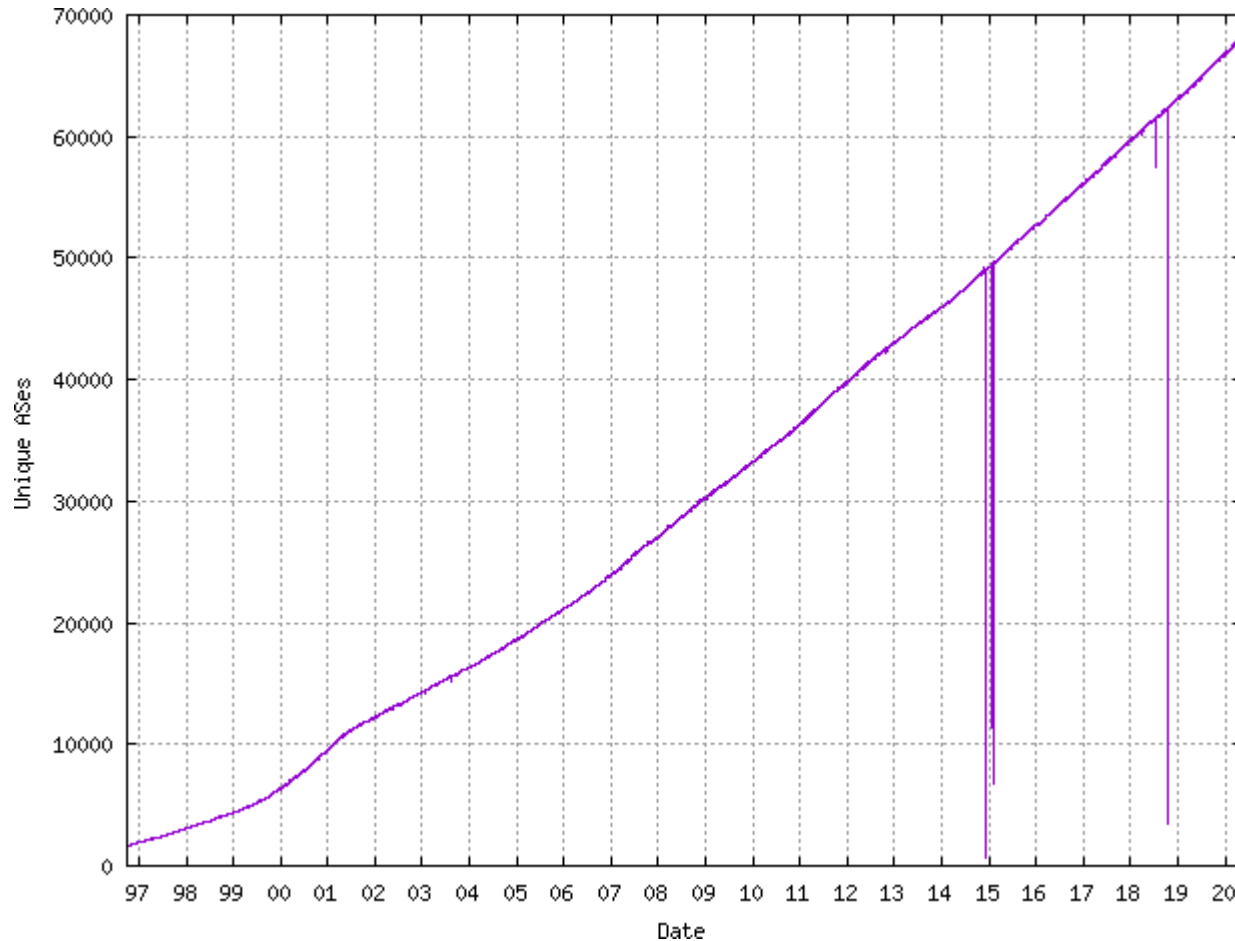
Introduction

This memo suggests an approach to protocols used in internetwork systems somewhat different from the main thrust of the work on the Transmission Control Protocol (TCP) [1]. The position taken here is that internetwork communication should be view as having two components: the hop by hop relaying of a message, and the end to end control of the conversation. This leads to a proposal for a hop by hop oriented internet protocol, an end to end oriented host level protocol, and the interface between them.

1977



Internet's coming of age: size and complexity



- Tens of thousands of new networks
- New technologies

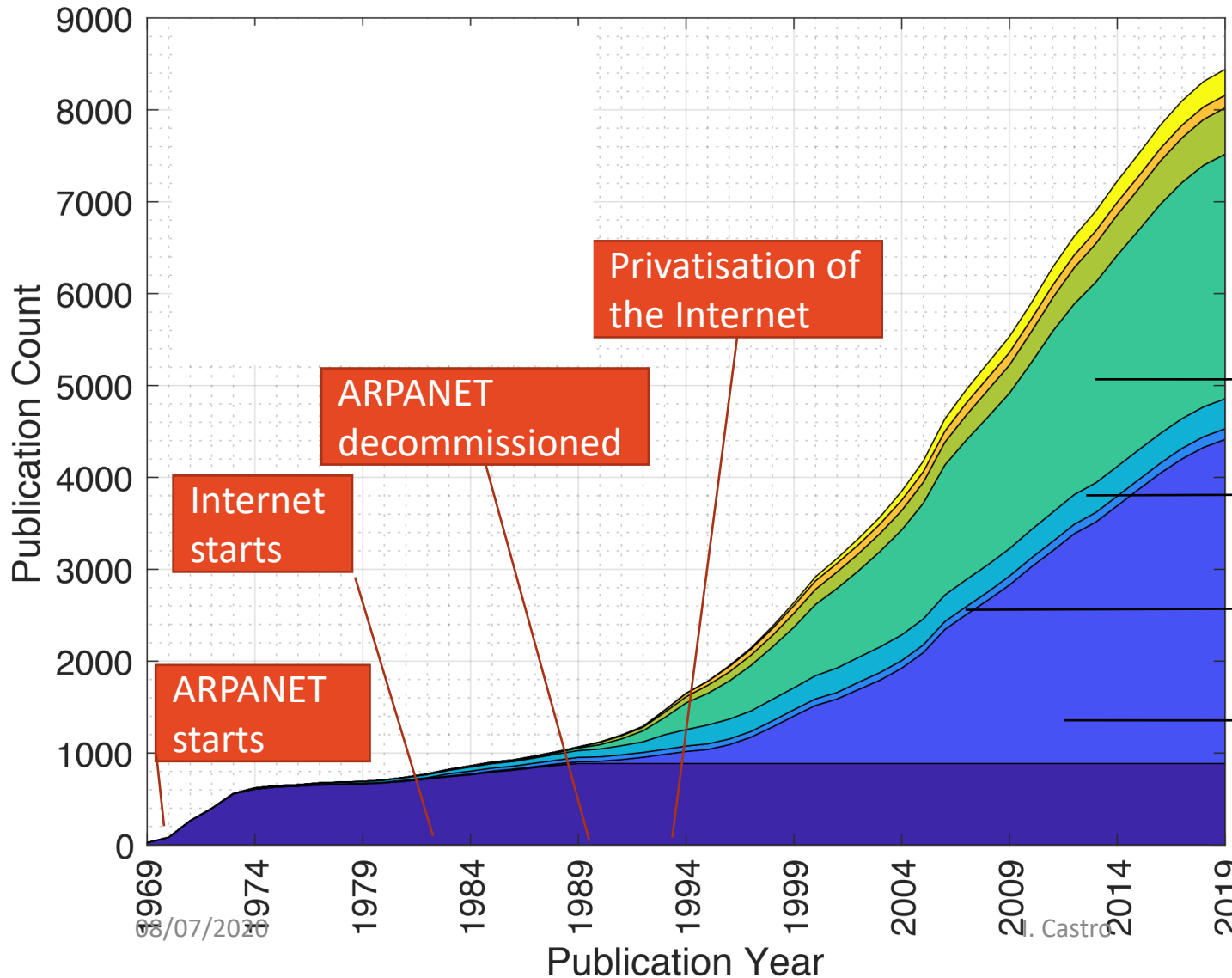
How to ensure interoperability? Conspire/RFCs

- **RFCs**==default documents for technical specification of Internet related aspects
- Different types of RFCs
- Open submission, any one can propose an RFC
- Internet Engineering Task Forum (IETF):
 - Open forum for standardisation of Internet protocols
 - Most RFCs are published through the IETF
 - Organised in Working Groups and areas

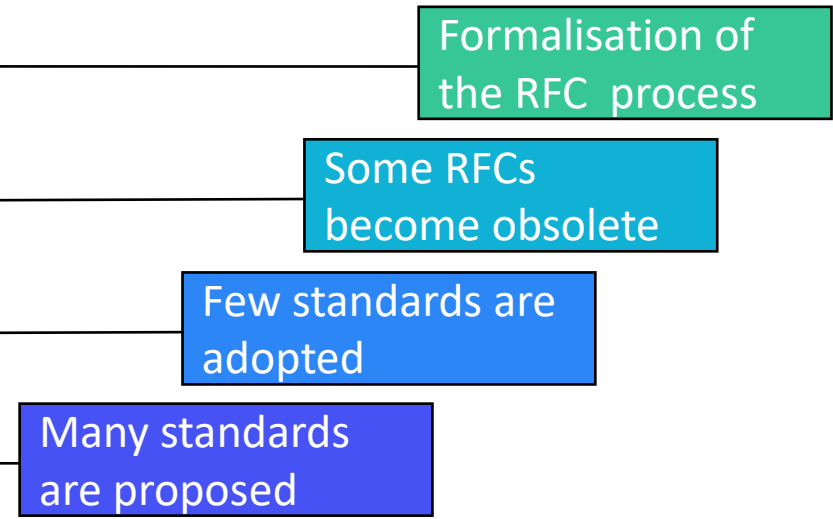
Deep diving into RFCs

- What can RFCs tell us about the Internet ecosystem?
- Are there coordination “problems”?

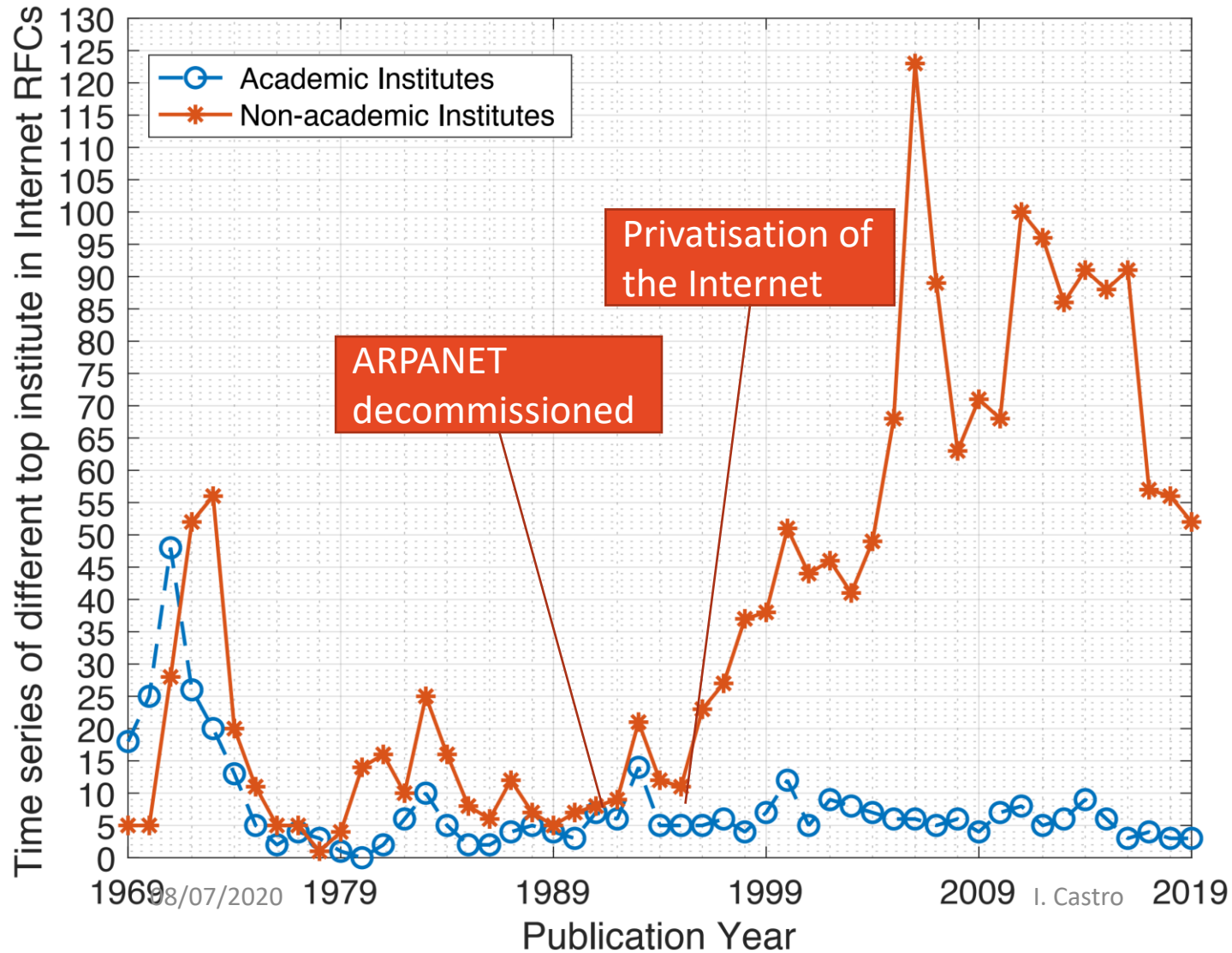
RFC growth to support interoperability



- RFC publication reflects the underlying ecosystem

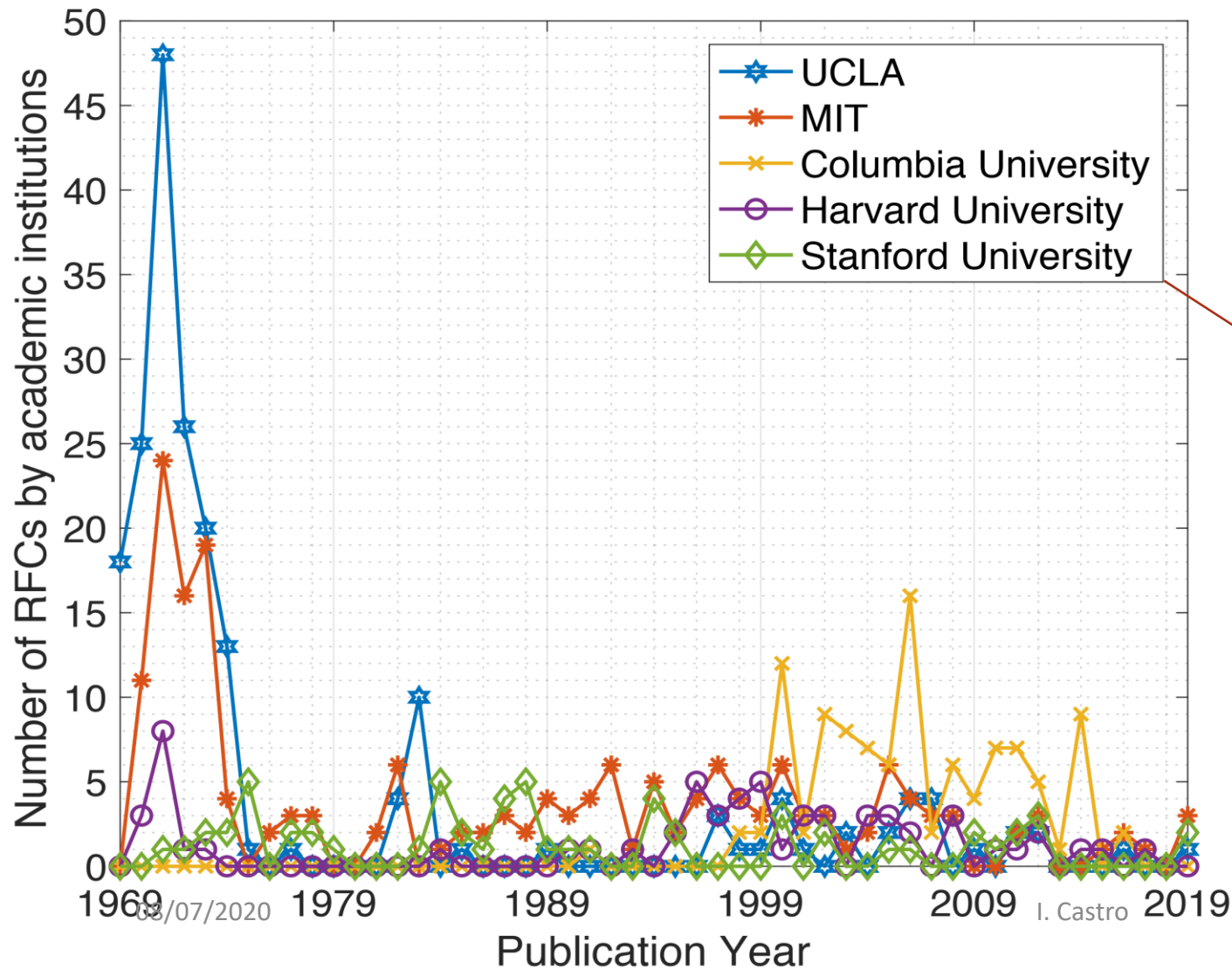


From research to industry



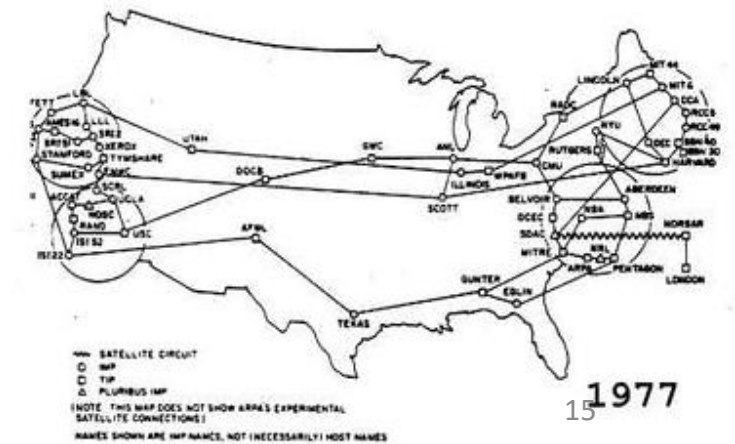
- RFC publication reflects the underlying stakeholders
 - From academic institutes
 - To commercial giants

From research

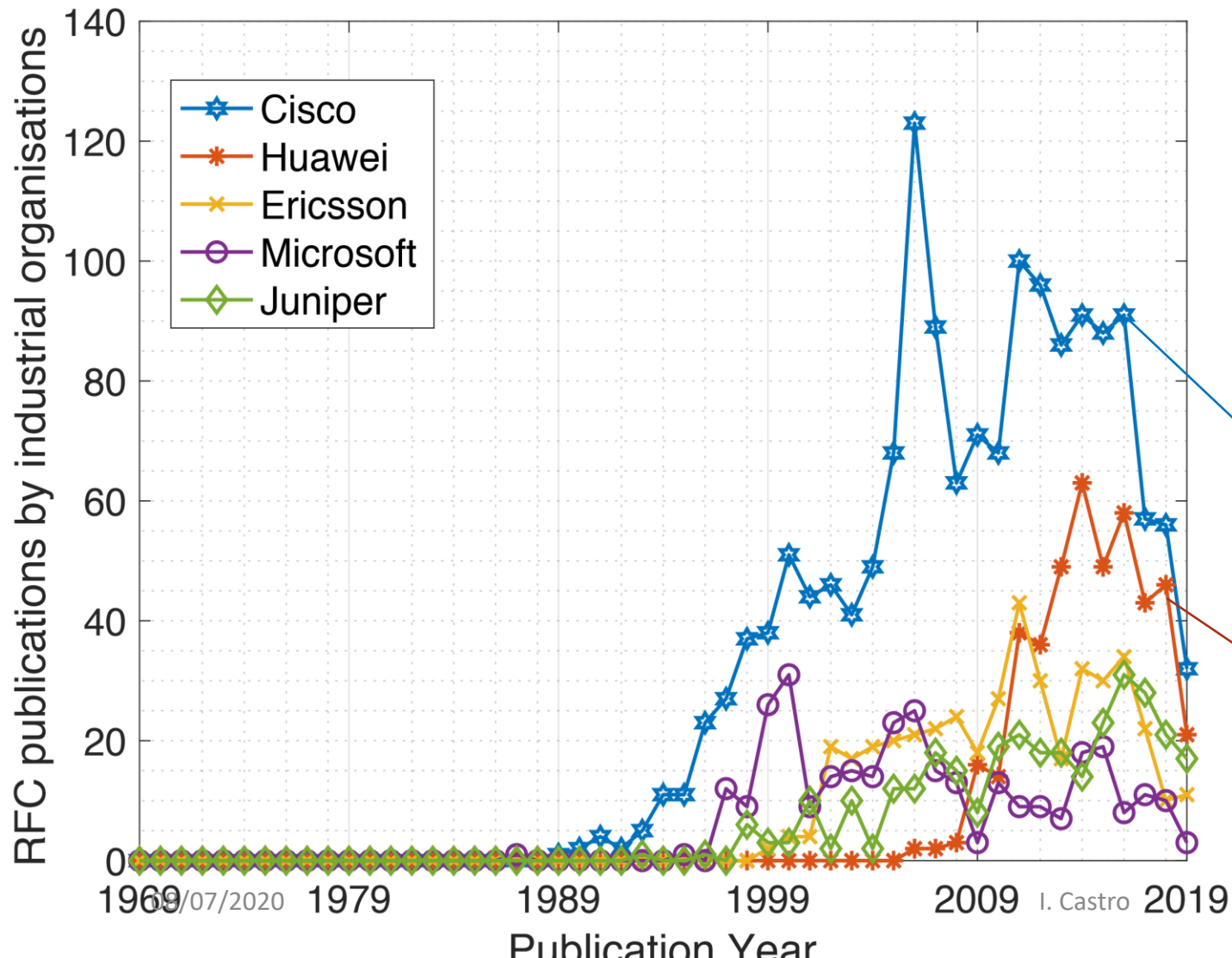


- RFC publication reflects the underlying stakeholders
 - From academic institutes

Nodes in the early ARPANET



To industry



- RFC publication reflects the underlying stakeholders
 - From academic institutes
 - To commercial giants

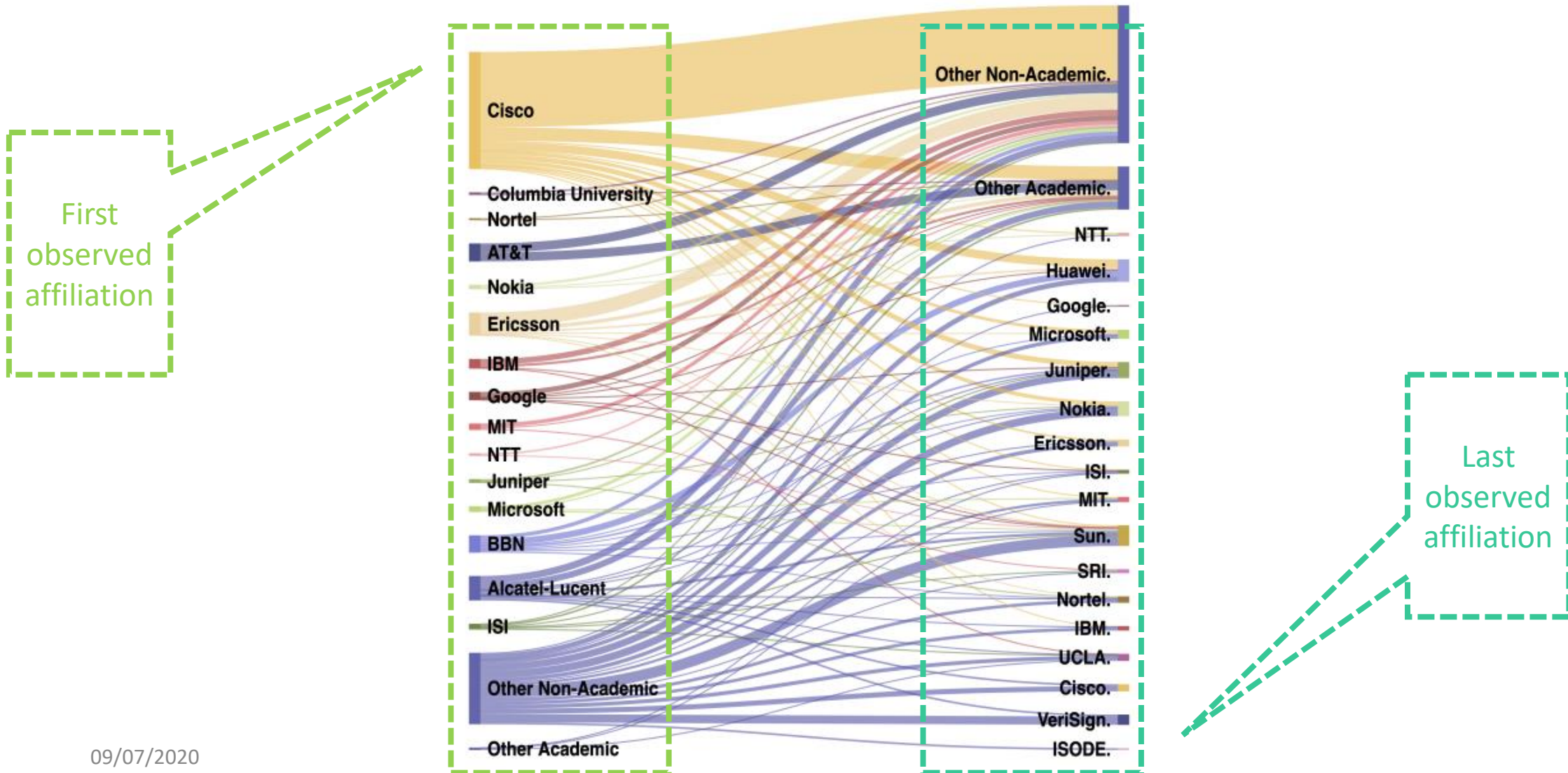
Rise and decline of Internet giants: CISCO



Rise of new giants: Huawei



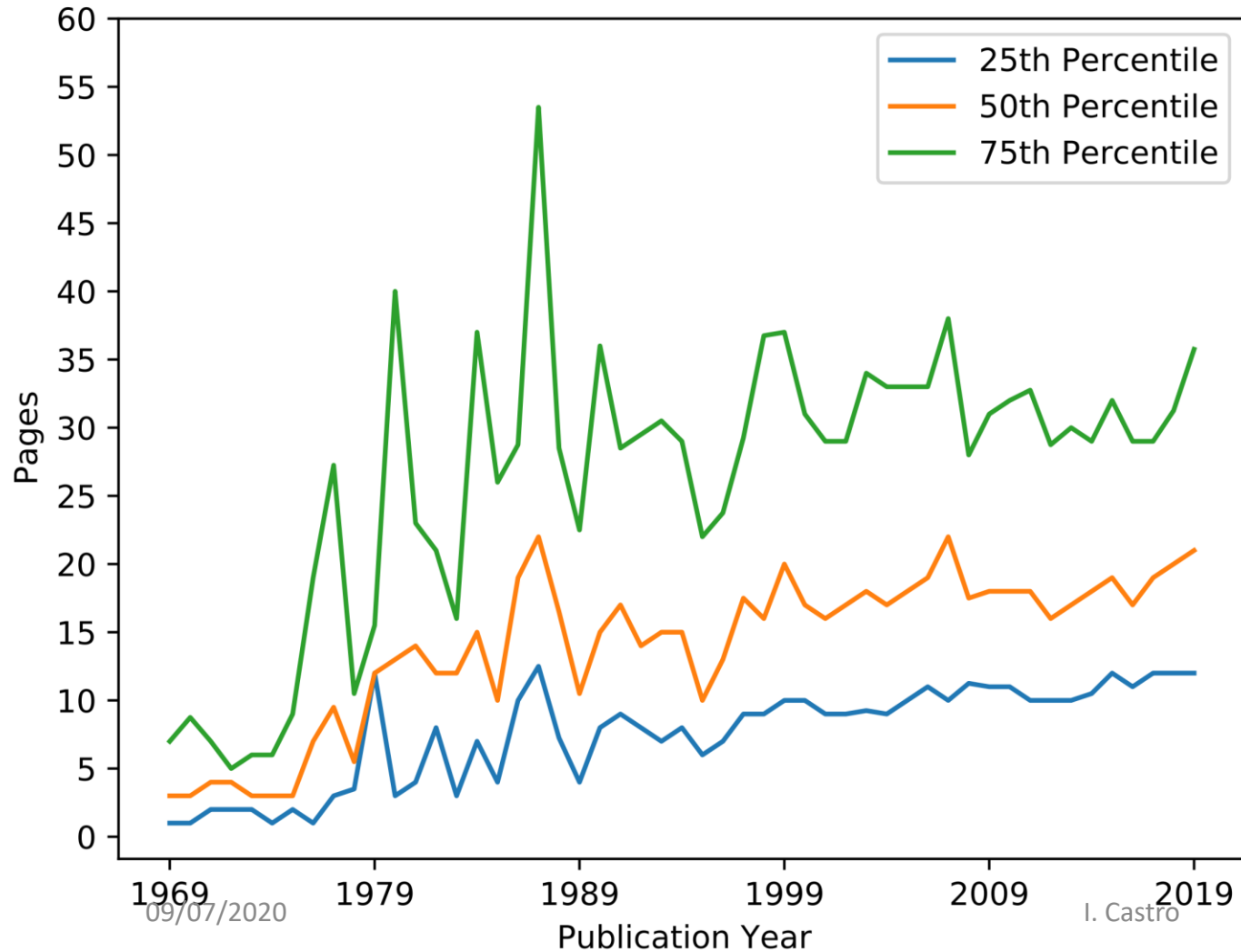
Competing for talent



Coordination costs:

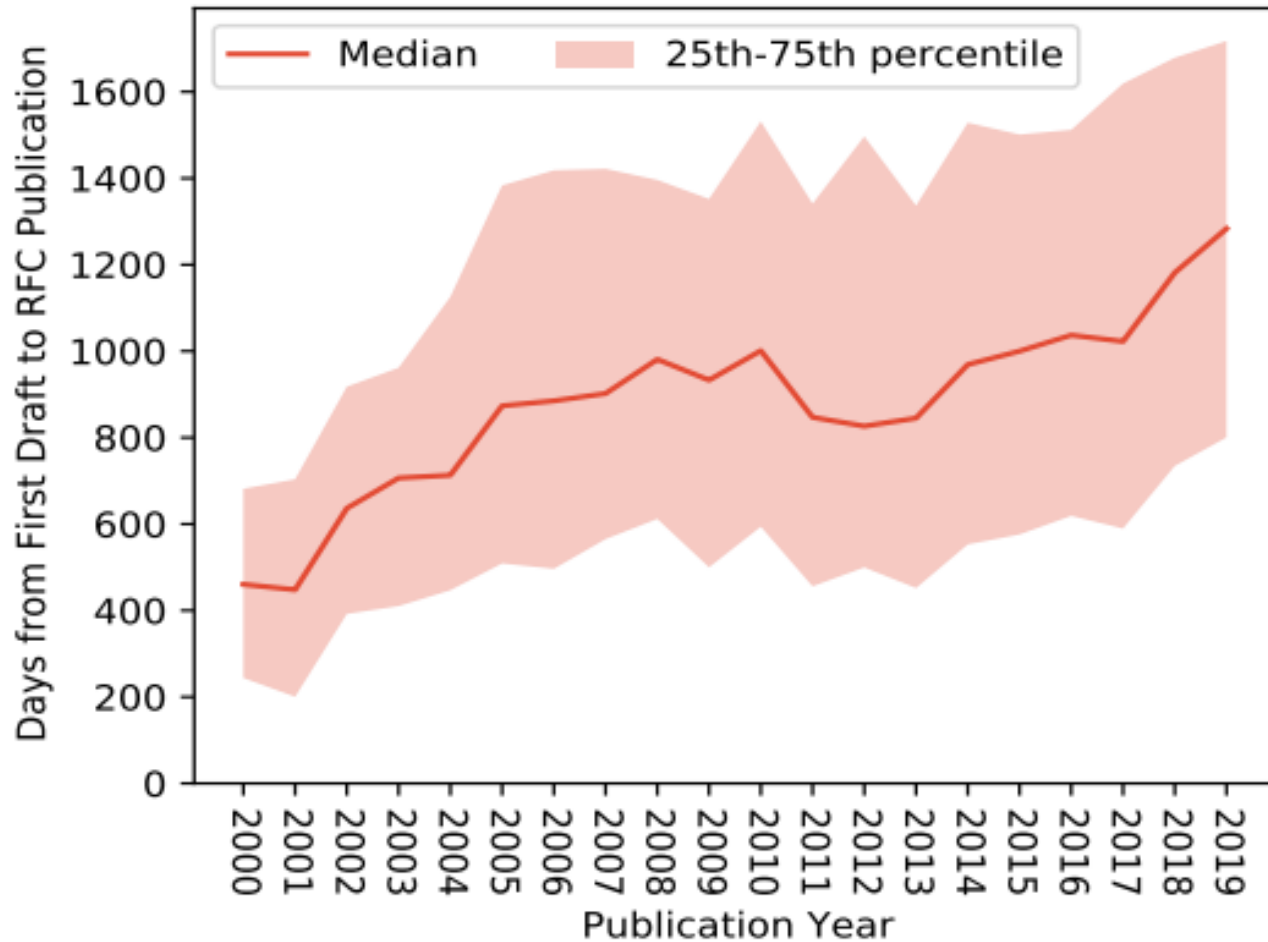
What is the cost of ensuring interoperability?

RFCs are longer



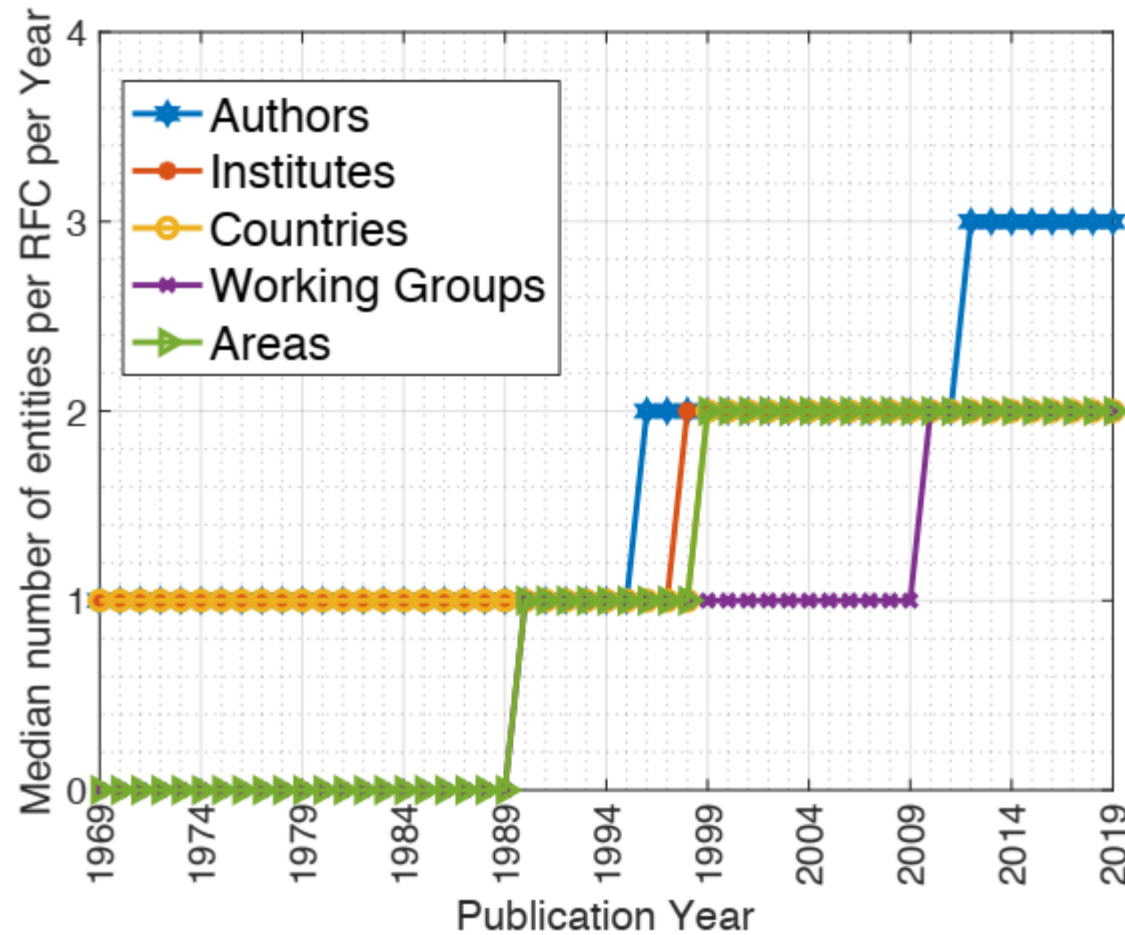
More pages

RFCs take longer (to be published)



More days

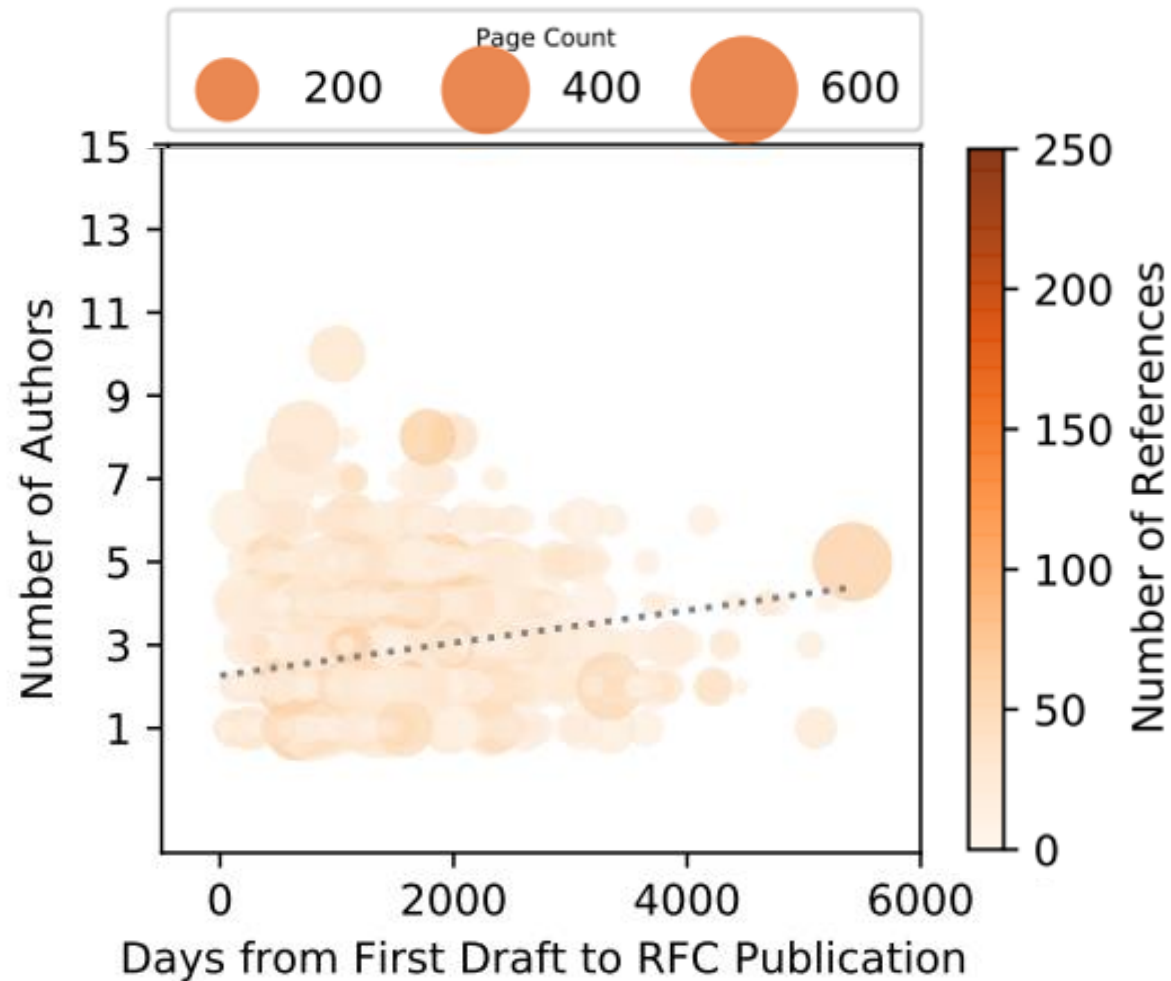
RFCs involve more...



More:

- People
- Institutions
- Countries
- Dependencies (WGs/Areas)

Is it/why is harder to publish an RFC?



(a) Standards track

What's next?

- Who is who in the Internet?
- What makes a successful standard?
- How to improve the process?

- Data
 - Mail-lists
 - History of edits of each document
 - Minutes/video of meetings