Academic Community and Education on Blockchain

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2019/4/26

Academic Research on Internet and Academic Research on Blockchain

Traditional way of technology development

Refinement by iteration

Experimental → **Technically Confirmed** → **Commercialization** → **New Applications/ Ecosystem**

Evolution of the Internet

ARPANET

CSNet

Research Networks (NSFNET) Non-Profit

Externalizing Costs Commercial ISPs Making $$$

1969 1981 1985 1991 1995

CIX

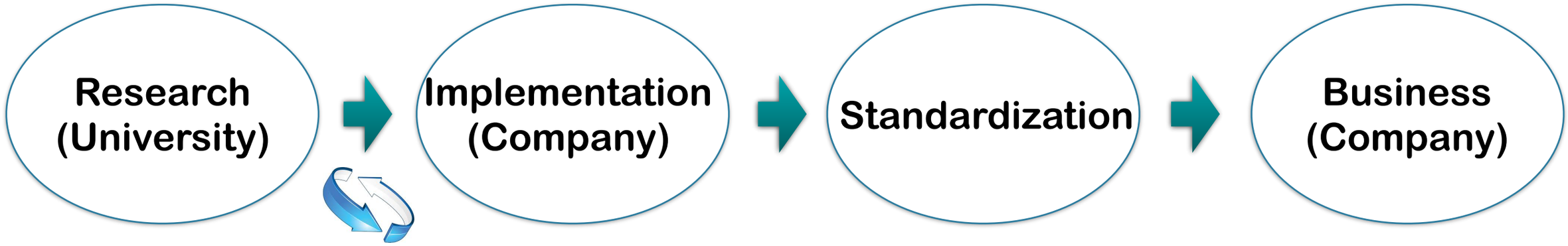
1977 1995

Berkeley Software Distribution (BSD)

NSFNET T3 Network 1992

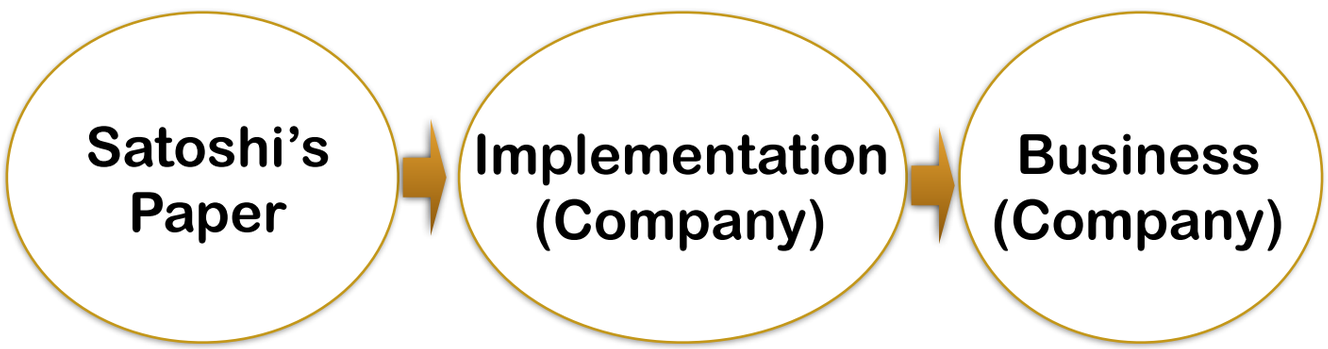
Academic Research for Blockchain

The Case of Internet Technology



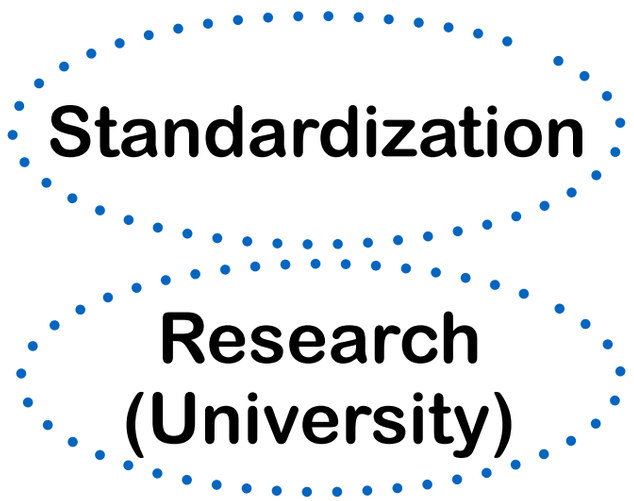
“BSD” and open-source facilitated innovation

The Case of Bitcoin and Blockchain



Business motivated Innovation

Need to rebuild by



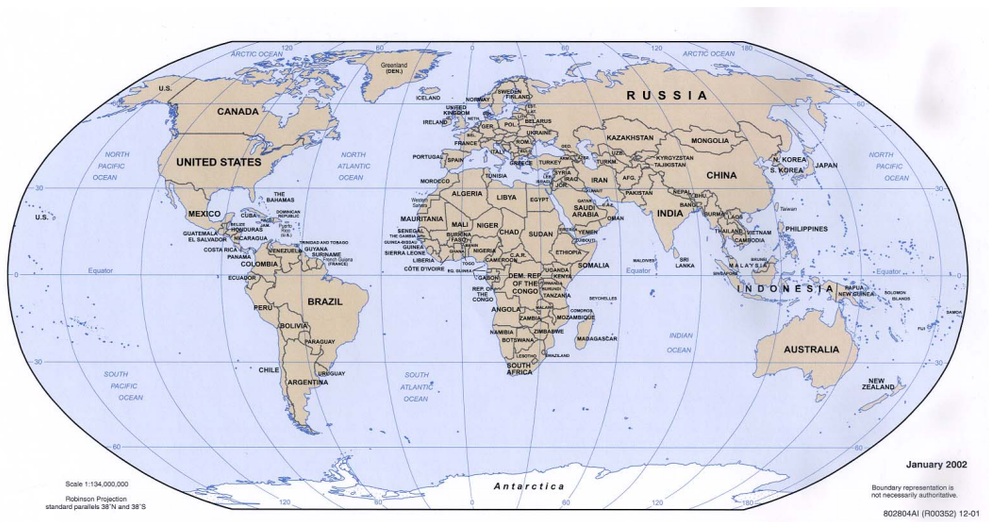
Help of Academia

Open Discussion
Research & Development
Testbeds
Establishment of Community

BSafe.network:
Plays the same role as NSFNet and BSD

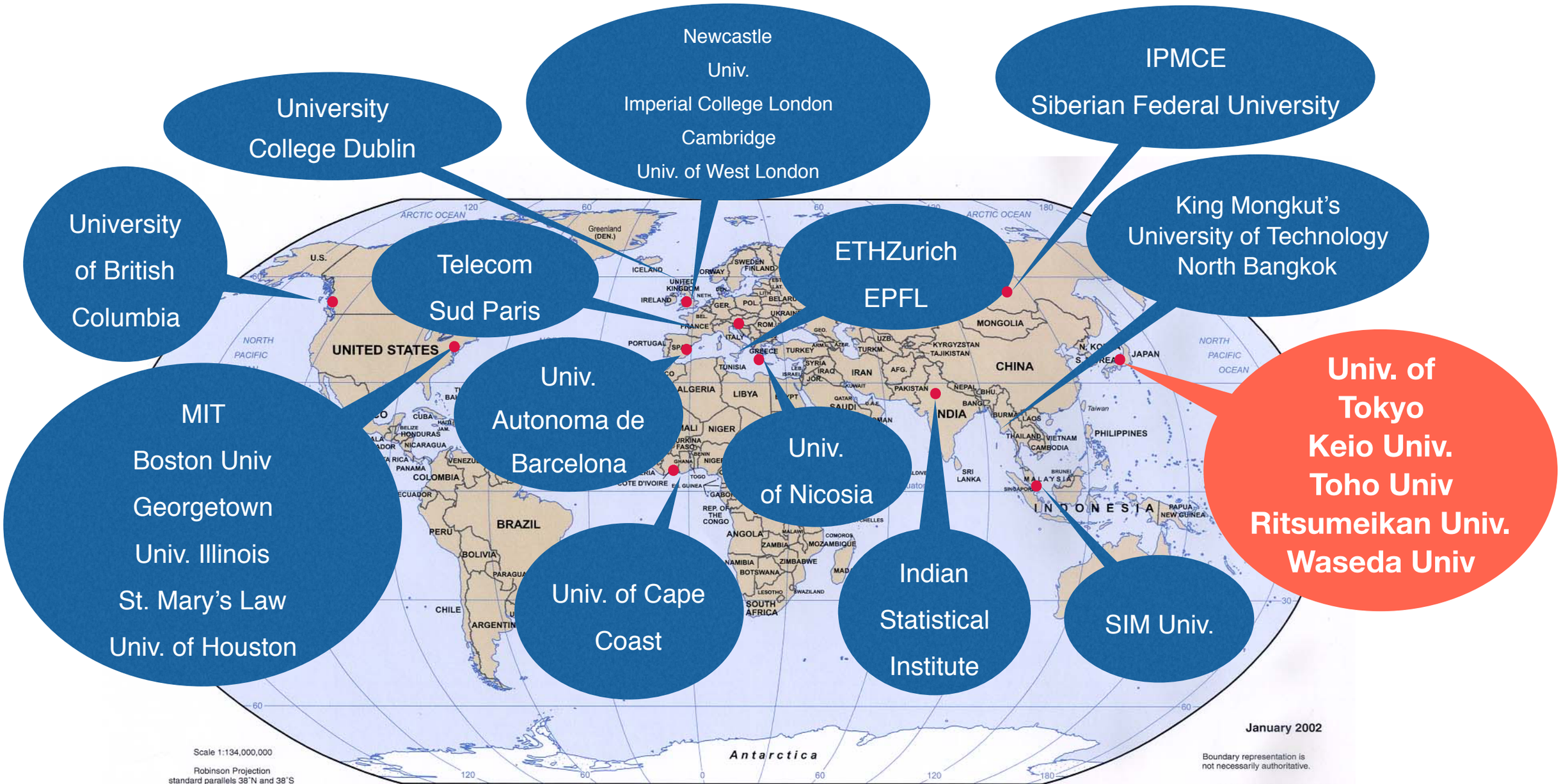
- A **neutral**, **stable** and **sustainable** research test network for Blockchain technology ***by international group of universities***.
- Founded by Shin'ichiro Matsuo and Pindar Wong in March 2016. Each university becomes a blockchain node.
- Research on Blockchain and its applications
  - Not limited to Security. All aspects will be researched.

BSafe network



Neutral platform
Un-anchored trust by Blockchain network
More nodes (with neutrality)
Testbed for academic research

Participating Universities Around the World



Educating Blockchain

Challenges to Teach Blockchain

- Teaching cybersecurity is challenging
- Teaching blockchain is similarly challenging

- Need to cover following topic
  - Crypto
  - Network (Overlay, Peer-to-Peer)
  - Application Development

Research Group Specificities

- At Keio University, Shonan Fujisawa Campus, we have two undergraduate schools with one nursing school, two graduate school
- Freshmen/women can come to lab to learn
  - (not typical in Japanese schools)

- Newcomer has various level of computer related technology capabilities
  - Latest top notch student: C++ capable

Blockchain Group

- 12 students (11 bachelors, 1 doctor)

Mini-Projects

- Three continuous mini-projects for undergrads in each semesters:
  - Work in Progress (WIP): Anything he/she can do. Final presentation at the end of semester
  - Term Project: problem definition + solution + evaluation. Minified version (and also a start-up phase) of bachelor thesis projects.
  - Bachelor thesis project

- Bachelor thesis project: two semesters
- TERM project: one semester, should be completed before bachelor project
- WIP: any semesters not working on the above two types of projects

Some of Mini-Projects

- Term projects:
  - Estimation of the change of size of the Bitcoin blockchain if migrated to Schnorr Signature
- Work in Progress
  - Survey on consensus alogorithm

Master Thesis

- Blockchain Storage Load Balancing Among DHT Clustered Nodes

- Blockchain as a Secure Configuration Mechanism for IoT Devices

- BIRR: Blockchain-based Internet Routing Registry

Some thoughts

- Need to understand data model of the blockchain, and how the crypto used to secure them
  - Even experienced engineers (Tech company guys) need to carefully understand

- Always need to try to fill “the gaps between knowledges,” but not necessary to learn fully group-up approach (very time consuming)

- Need to keep motivation — the height of the mountain the students need to climb is high and steep. Carefully removing obstacles helps them

Conclusion

- Academic approach to blockchain:
  - There is lot of papers written in last a few years, but we need to understand it precise manner. Also, the topic is *fast moving target* the hot topics are keep changing/growing..
  - In some of the research area, international collaboration helps.
  - We’re calling for collaborators

- Teaching:
  - While the topic is challenging, it is still approachable with help
  - Some of the students are really enthusiastic on the topic but lacks technical background. Provide them good technical background without losing their enthusiasm is challenging, but fun.