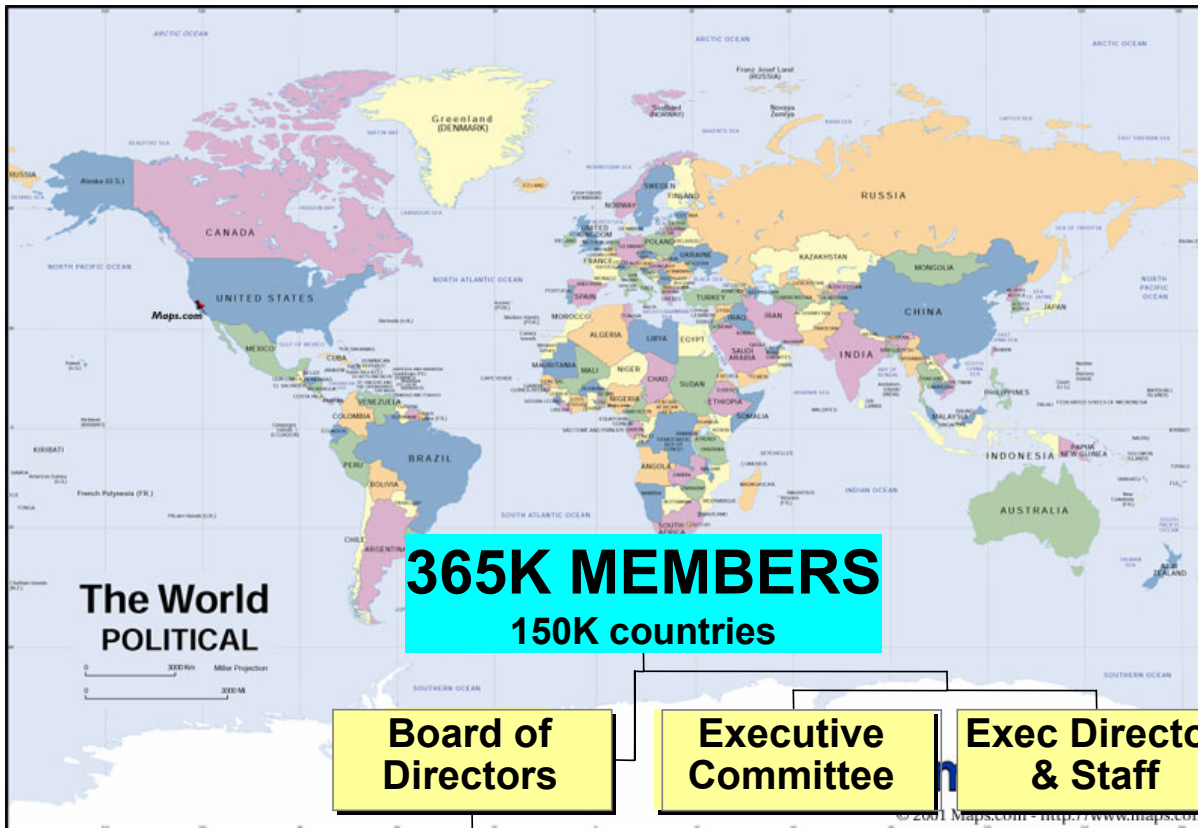


Technology, Standards and Business ...a complex relationship

IEEE 802 LAN/MAN as an example
February 2004

Outline

- IEEE Standards Association standards primer
 - Organization and process
- IEEE 802 case study
 - Review of commercial successes and failures
- Discussion
 - This session is meant to be interactive—please ask questions during the presentation!



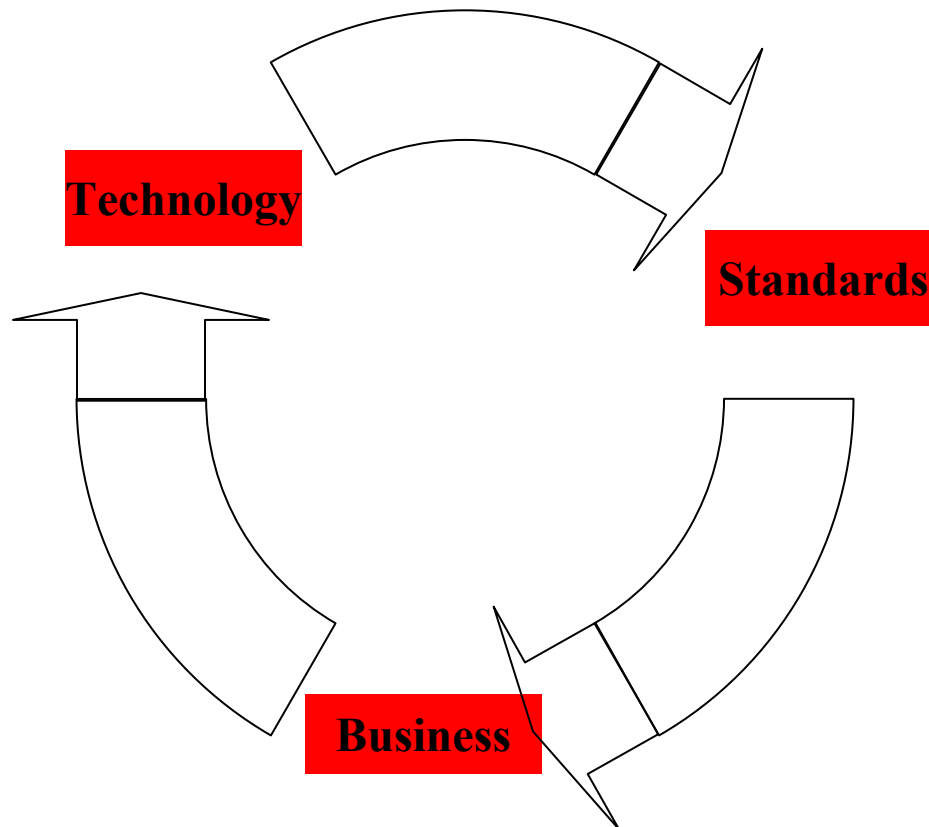
Imperative Principles of the Standards Process

- Due Process (fairness)
- Openness (anyone can participate)
- Consensus (need a 75% majority)
- Balance (users, producers, general interest)
- Right of Appeal (ability to contest decisions)

LMSC Process

- 3 plenary sessions per year
 - Entire LMSC holds meetings (~1200 attendees)
 - approximately 40 simultaneous projects
 - March, July, November
- 3 interim sessions per year
 - Typically among related working groups
 - 802.11, 802.15, 802.18, 802.19 600 attendees
 - 802.16; 802.20 250 attendees
 - 802.1, 802.3, 802.17 300 attendees

Relationships



Key Elements of Technology Success

- Functionality
 - It works
 - (WLAN MAC, PHY and RF)
- Ease of implementation
 - May be internally complex, but simple to build into systems
 - (Silicon, Software, Reference designs)
- Mass producible
 - Low cost

Key Elements of Standards Success

- Existing implementations
 - Proven technology
- Significant demand
 - Encourages competitors to work together
- Good leadership
 - Building consensus in a highly competitive atmosphere

Key Elements of Business Success

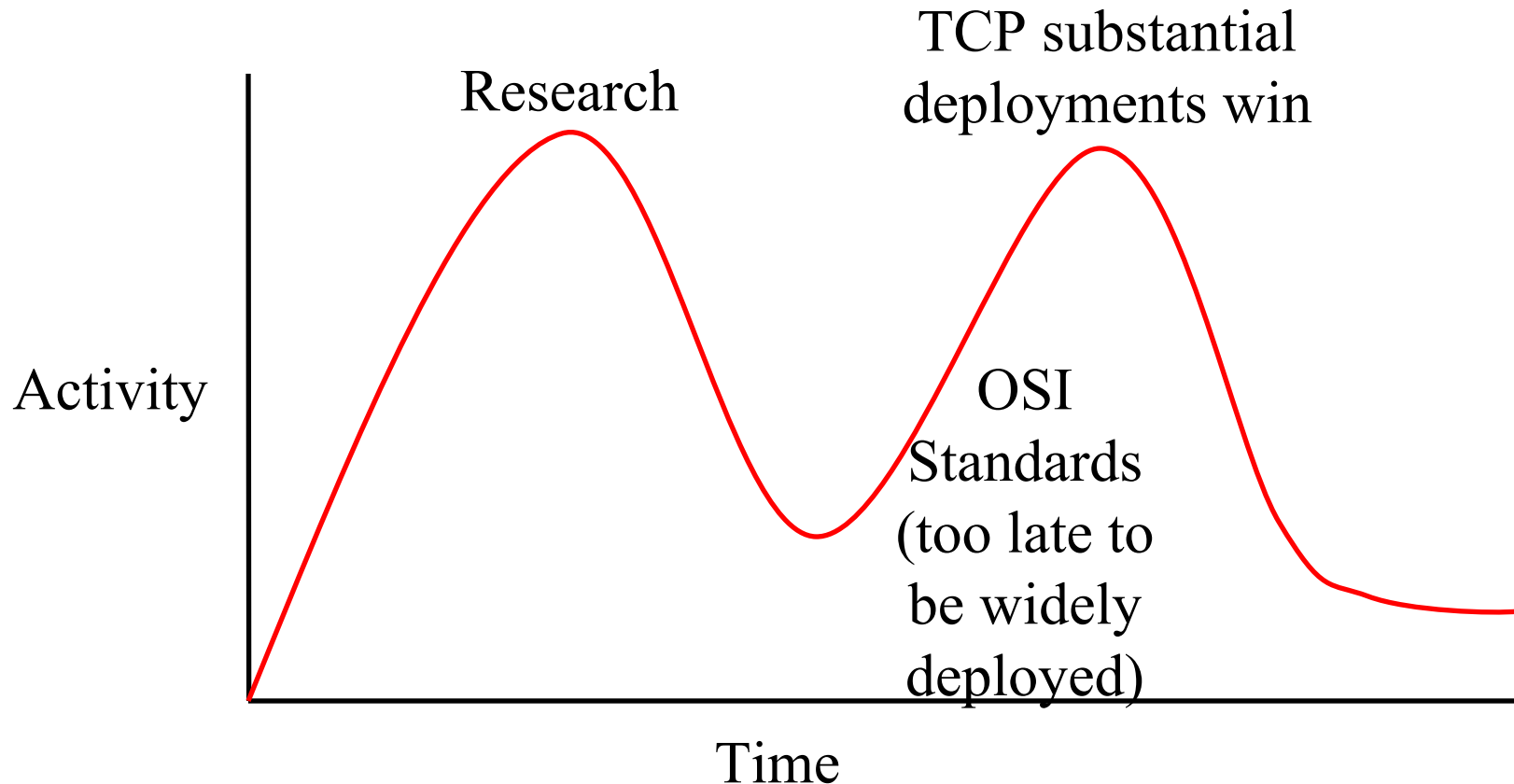
- Timing
 - Unsatisfied intrinsic demand
- Low cost
 - Competition
- Execution
 - Hard working, focused ‘A+’ team

Value of Standards

- High quality specifications
 - Broad industry review by experts
- Intellectual property is shared
 - Reasonable and non-discriminatory licensing terms
- Cost of technology is driven down
 - Higher volume
 - Multiple suppliers

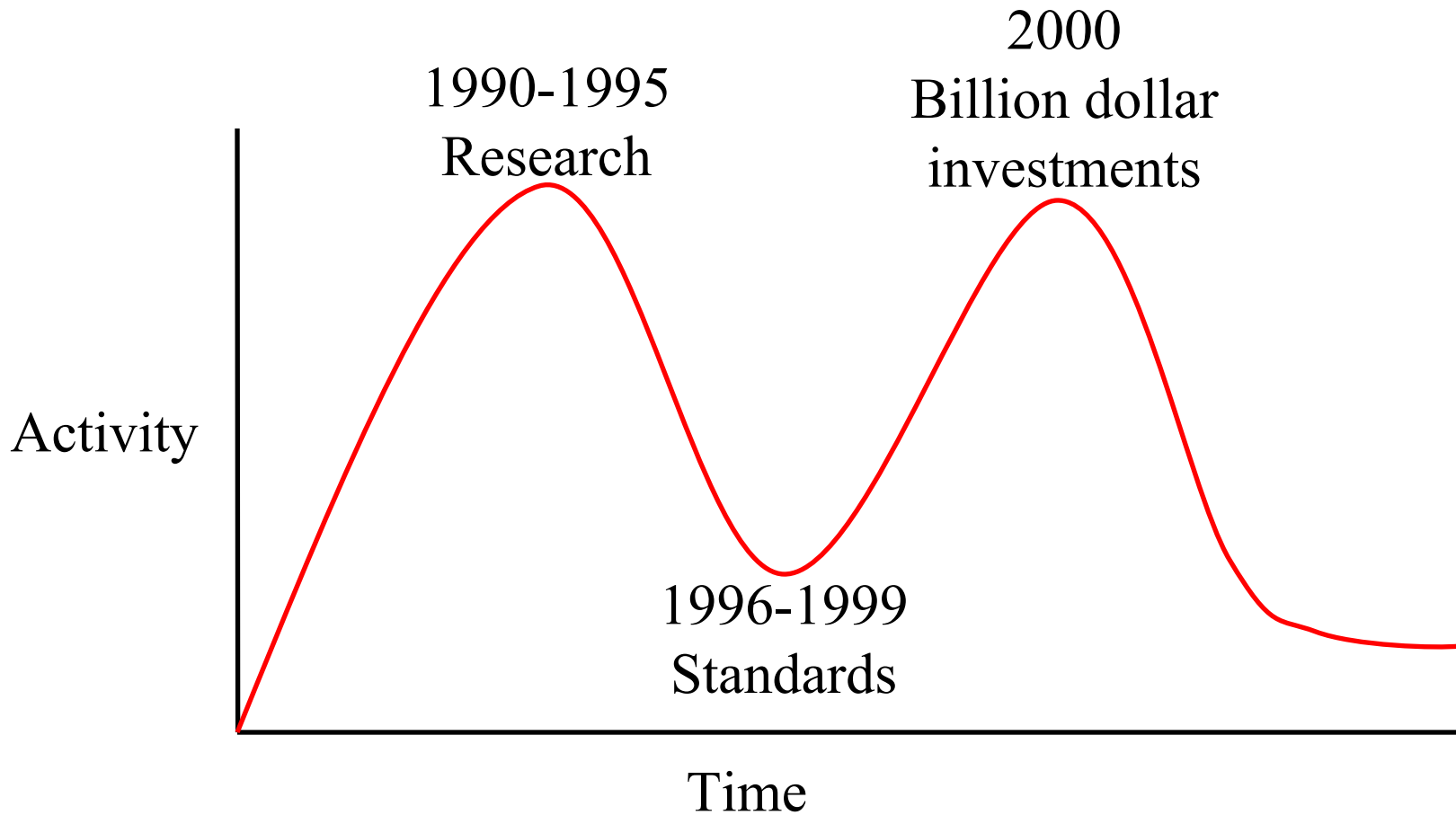
OSI: Failure (vs TCP/IP)

The Apocalypse of the Two Elephants



Source: Dr. David Clark, head of Advanced Network Architecture research group, MIT's Laboratory for Computer Science

802.11: Success!



802 based technology successes rating

- Wide deployment
 - 802.3 Ethernet & 802.1 Bridging
 - 802.11 Wireless LAN
- Moderate deployment
 - 802.5 Token Ring
- Limited deployment
 - 802.4, 802.6, 802.9, 802.10, 802.12, 802.14
- To be determined...
 - 802.15 Wireless PAN
 - 802.16 Fixed Wireless Access
 - 802.20 Mobile Broadband Wireless Access

Non-wireless activities

- 802.1 Overview and architecture
 - Bridging, architecture, addressing, security
 - Upper layers, liaison with IETF
- 802.3 Ethernet
 - LANs: faster, faster, faster – 10/100/1,000/10,000Mbps fiber and copper
 - Access Networks -- Ethernet in the First Mile
 - Smaller—backplane ethernet
 - Synchronous—preliminary studies
- 802.17 Resilient Packet Ring
 - Metropolitan Area Networking

Wireless Activities

- 802.11 Wireless Local Area Networks
 - 100+meters coverage
 - Unlicensed in 2.4GHz and 5GHz bands
- 802.15 Wireless Personal Area Networks
 - 10+meters coverage
 - Unlicensed in 2.4GHz and 5GHz bands
- 802.16 Fixed Broadband Wireless Access
 - 1000+ meters coverage
 - Unlicensed and licensed frequencies
 - 2-11GHz and 10-66GHz bands

Wireless Activities

- 802.18 Radio Regulatory Technical Advisory Group
 - Regulatory support (FCC, ITU-R)
- 802.19 Coexistence Technical Advisory Group
 - Develop policy and procedure to coordinate sharing of unlicensed spectrum by 802 Data Links
- 802.20 Mobile Broadband Wireless Access WG
 - 1000+ meter coverage
 - Licensed frequencies, under 3.5 GHz

Possible Future Directions

- Wireless
 - WLAN Enhancements
 - Mesh networking, fast roaming, vehicular apps
 - Unlicensed 54-60 GHz—lots of bandwidth
 - LAN and PAN applications
 - 70 GHz point to point wireless PHYs
- Wireline
 - Backplane Ethernet
 - Synchronous Ethernet

URLs

- IEEE 802 home page
 - www.ieee802.org
- Working Groups home pages
 - www.ieee802.org/dots.html

Paul Nikolich - IEEE 802 Chair

- EMAIL: p.nikolich@ieee.org
- Phone: 857.205.0050 (Cellular)

- Independent consultant in technology and new ventures working with YAS Broadband Ventures, LLC. in North Andover MA

- Goals for IEEE 802 – 2002-2004
 - Encourage the development of new standards work
 - Maintain IEEE802's outstanding track record of developing data communications standards that benefit society.
 - Ensure the imperative principals of due process, consensus, openness, balance and rights of appeal are implemented.
 - Increase the efficiency of the standards development process