Crippled by its Own Strengths:
The Software Infrastructure of the
Commercializing Internet

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Background of Project

- Part of edited book, Aspray & Ceruzzi
- Contemporary History
    - Recounting of basic events from secondary sources
    - Focus on interplay between technology and business models
- Two chapters
    - Software infrastructure chapter – web, email, protocols
    - Search and portals
- Focus here is on the ARGUMENT

Reconstruction of Technology

- What happens when an already "shaped" technology gets
    - New uses
    - New "relevant social groups"
    - New cultural meanings
- Thoughts at the back of my mind
    - VHS vs Beta, QWERTY vs. Dvorak? –
        - which is the net?
    - Ecological?
        - Extinction of the megafauna
        - Native Americans and Smallpox
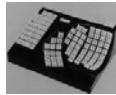
What We Already Know

- An excellent history of developments pre-commercialization
    - J. Abbate, *Inventing the Internet*, MIT Press, Cambridge, MA, 1999.
- Internet evolves from ARPANET of 1970s
    - Created with adoption of TCP/IP protocol in early 1980s to interconnect networks
- How was the internet shaped?

Construction of Internet Technologies

- Closed, homogenous, small academic population
    - Results: Rely on social mechanisms for security, elimination of troublemakers
- Practical, working network
    - Rather have it next week than perfect
- Non-commercial
    - No mechanisms to bill for use of resources
- Support for many machine types
    - Compatibility through standards, not code

Construction of Internet Technologies II

- Decentralized and international
    - Easy to connect new machines, sub-domains
- Many different communication mechanisms
    - TCP/IP works over many media
- Connects computers to each other
    - Peer to Peer – any machine can be client or server
- Created for experimentation and research, not one specific task
    - Separation of application protocols from network mechanisms

Protocol

- Crucial to the Internet
  - Protocol is a specification for codes and behavior of communication between computer programs
  - Internet protocols are "open" – allowing anyone to write software to implement them

Layering of Protocols

FTP Client	Mail client	Web browser	Many others....
FTP (File transfer)	SMTP (Mail transfer)	HTTP (Web)	Video, chat, news, P2P, instant messaging
Socket API			
TCP/IP (also DNS shared by applications)			
Ethernet	SLIP/ PPP	Satellite	Fiber Optic, Etc.

Internet Commercialization

- Rapid and unexpected, 1994-95
  - Though idea of "information superhighway" and universal networking was not
- Internet protocols are layered
  - Split huge tasks into small, discrete pieces
  - Tech framework for "hacker culture"?

Why So Popular?

- Driven by virtues
  - Web and email as killer apps
  - High quality, free(ish) multiplatform software
  - Real, useful, pragmatic
  - Flexible for new apps like streaming video
  - Anyone can publish
- Adopted by existing online services
  - AOL, Compuserve, etc.

Internet Email

- SMTP is Internet Email protocol (1982)
  - "Pushes" messages to destination
- Classic example of internet approach
  - Builds on TCP/IP and DNS
  - Initial version very simple, so easy to implement from RFC
    - Tech support for "hacker" culture?
  - Later standards build on this, add features
    - eg MIME

Simple Charms

- No frills
  - Plain text only
  - No verification of sender identity
  - No way to charge sender
  - Very simple addressing mechanism
  - Reading, composition, sorting of email left to other tools
- In early commercial period, Internet email
  - Is a lingua-franca between closed systems
  - Is cheap and easy to implement
  - Does the job
  - Has easy to remember addresses

Unlike "official" X.400 standards

- Agreed in 1984
  - Part of OSI standards effort of 1980s, early 1990s
  - Backed by all major computer firms (Microsoft, DEC, IBM), governments, telecoms firms
- Lots of features, including
  - Security
  - Verification of ID of sender
  - Notification when message read
- Clunky, all things to all people
  - Eg, an email address in minimal form
  - G=Harald; S=Alvestrand; O=sintef; OU=delab; PRMD=uninett; ADMD=uninett; C=no.

Spam & Technological Momentum

- Perfect environment for spam
  - Internet has no natural defenses against spammers
- Plenty of proposed standards available to make email
  - Secure and authenticated
  - Give proof of receipt
  - Support email directories, etc
- But require simultaneous shift of client, server, user behavior.
  - Will probably never happen...
  - Especially as Microsoft has a proprietary system
- Ugly and imperfect workarounds
  - Spam filtering, etc.

Commercial Internet Email

- Traditional packaged application model struggles
  - People expect downloads
  - Free software is available and expected
    - No lock-in as standards are open
  - Microsoft kills the market with bundling
- New models emerge
  - Webmail – Hotmail as big success
    - Follows Internet tradition of integrating existing technologies and code

Web: Business History

- My chapter covers all the basics
  - Berners-Lee and CERN
  - Gopher, WAIS, etc
  - Mosaic
  - Netscape
  - Browser wars
  - Java
  - Firefox

Focus and Arguments I

- Initial appeal of web as integrator of existing content
  - FTP, news, Gopher, telnet
- Obvious development of existing ideas
  - New elements: HTML, HTTP, URL
- Simplicity of web
  - Fundamental problems ignored
    - Searching
    - Hyperlink issues
  - Follows spirit of internet

Influence on Business Models

- No support for payment for content
  - Micropayment hyped but flops
  - Web publishing model shifts fundamentally from AOL era
- Users resist subscription services
- Economic foundation for web publishing comes from advertising
  - Initially favors big firms

Focus and Arguments II

- Co-evolution of browser and server
  - Importance of Apache to keep things open
- Importance of AOL and ISPs
  - As distributors, packages of software
- Work needed to reconstruct browser as commerce platform
  - SSL and credit card protection
  - Creation of logins and sessions – CLUNKY
  - Creation of web development platforms
  - Packaging of internet storefronts, etc.

Web Navigation Business

- Unlike earlier electronic publishing, the web has no search or index built in
  - Makes publishing very easy, retrieving very hard
- Creates huge business opportunity. 2 models
  - Web Directory (Yahoo, Magellan)
  - Web Search (Excite, Lycos, AltaVista)

Struggle for Business Model

- Search does not seem well-matched to Web's advertising model
  - Excite, Infoseek, Lycos, AltaVista destroy themselves trying to be "portals"
  - But Google realizes the power of search advertising
    - Syndicates to smaller sites
    - Opportunity shaped by architecture of net.

The End

- My website is www.tomandmaria.com/tom
- My email is thaigh@computer.org
- Feedback sought