# CS155b: E-Commerce

Lecture 13: February 25, 2003

**Some Basics of Venture Capital**

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# What is Venture Capital?

- Private or institutional investment (capital) in relatively early-stage companies (ventures)
- Recently focused on technology-heavy companies:
  - Computer and network technology
  - Telecommunications technology
  - Biotechnology
- Types of VCs:
  - Angel investors
  - Financial VCs
  - Strategic VCs

# Angel Investors

- Typically a wealthy individual
- Often with a tech-industry background, in position to judge high-risk investments
- Usually a small investment (< $1M) in a very early-stage company (demo, 2-3 employees)
- Motivation:
  - Dramatic return on investment via exit or liquidity event:
    - Initial Public Offering (IPO) of company
    - Subsequent financing rounds
  - Interest in technology and industry

# Financial VCs

- Most common type of VC
- An investment firm, capital raised from institutions and individuals
- Often organized as formal VC funds, with limits on size, lifetime and exits
- Sometimes organized as a holding company
- Fund compensation: carried interest
- Holding company compensation: IPO
- Fund sizes: ~$25M to 10's of billions
- Motivation:
  - Purely financial: maximize return on investment
  - IPOs, Mergers and Acquisitions (M&A)

# Strategic VCs

- Typically a (small) division of a large technology company
- Examples: Intel, Cisco, Siemens, AT&T
- Corporate funding for strategic investment
- Help companies whose success may spur revenue growth of VC corporation
- Not exclusively or primarily concerned with return on investment
- May provide investees with valuable connections and partnerships
- Typically take a "back seat" role in funding

# The Funding Process: Single Round

- Company and interested VCs find each other
- Company makes its pitch to multiple VCs:

  Business plan, executive summary, financial projections with assumptions, competitive analysis
- Interested VCs engage in due diligence:
  - Technological, market, competitive, business development
  - Legal and accounting
- A lead investor is identified, rest are follow-on
- The following are negotiated:
  - Company valuation
  - Size of round
  - Lead-investor share of round
  - Terms of investment
- Process repeats several times, builds on previous rounds

# Due Diligence: Tools and Hurdles

- Tools:
  - Tech or industry background (in-house rare among financials)
  - Industry and analyst reports (e.g., Gartner)
  - Reference calls (e.g., beta's) and clients
  - Visits to company
  - DD from previous rounds
  - Gut instinct
- Hurdles:
  - Lack of company history
  - Lack of market history
  - Lack of market!
  - Company hyperbole
  - Inflated projections
  - Changing economy

# Terms of Investment

- Initially laid out in a term sheet (not binding!)
- Typically comes after a fair amount of DD
- Valuation + investment → VC equity (share)
- Other important elements:
  - Board seats and reserved matters
  - Drag-along and tag-along rights
  - Liquidation and dividend preferences
  - Non-competition
  - Full and weighted ratchet
- Moral: These days, VCs extract a huge amount of control over their portfolio companies.

# Basics of Valuation

- Pre-money valuation V: agreed value of company prior to this round's investment (I)
- Post-money valuation V' = V + I
- VC equity in company: I/V' = I/(V+I), not I/V
- Example: $5M invested on $10M pre-money gives VC 1/3 of the shares, not $\frac{1}{2}$
- Partners in a venture vs. outright purchase
- I and V are items of negotiation
- Generally company wants large V, VC small V, but there are many subtleties…
- This round's V will have an impact on future rounds
- Possible elements of valuation:
  - Multiple of revenue or earnings
  - Projected percentage of market share

# Board Seats and Reserved Matters

- Corporate boards:
  - Not involved in day-to-day operations
  - Hold extreme control in major corporate events (sale, mergers, acquisitions, IPOs, bankruptcy)
- Lead VC in each round takes seat(s)
- Reserved matters (veto or approval):
  - Any sale, acquisition, merger, liquidation
  - Budget approval
  - Executive removal/appointment
  - Strategic or business plan changes
- During difficult times, companies are often controlled by their VCs

# Other Typical VC Rights

- Right of first refusal on sale of shares
- Tag-along rights: follow founder sale on pro rata basis
- Drag-along rights: force sale of company
- Liquidation preference: multiple of investment
- No-compete conditions on founders
- Right to participate in subsequent rounds (usually follow-on)
- Later VC rights often supercede earlier
- Anti-Dilution Protection
  - Recompute VC shares based on subsequent "down round" so that issuing more shares does not "dilute" the value of VC's holding
  - Two recomputation methods: weighted ratchet and full ratchet (see next slide)
  - Matters in bridge rounds and other dire circumstances

# Anti-Dilution Protection

- Example:
  - Founders have $N_1$ = 10 shares, VC has $N_2$ = 10 shares at $p_1$ = \$1 per share
  - Founder issues $N_3$ = 1 additional share at $p_2$ = \$0.10 per share (down round)
- Recompute number of shares to keep VC value = $N_2 \times p_1$
  - VC now owns $N_2 \times \frac{p_1}{q}$ shares out of a total $\left( N_2 \times \frac{p_1}{q} \right) + N_1 + N_3$ .
  - The new price q depends on the computation method:
- Weighted ratchet: use average (weighted) share price
  - $q = \frac{N_1 p_1 + N_3 p_2}{N_1 + N_3}$ = (total non-VC share value) / (total # non-VC shares)
  - Example: Avg. price 10.10/11, VC now owns ~10.89 shares out of a total 21.89
- Full ratchet: use down-round share price
  - $q = p_2$
  - Example: VC now owns 10/0.10 = 100 shares (out of 111)

# Why Multiple Rounds and VCs?

- Multiple rounds:
  - Many points of valuation
  - Company: money gets cheaper if successful
  - VCs: allows specialization in stage/risk
  - Single round wasteful of capital
- Multiple VCs:
  - Company: Amortization of control!
  - VCs:
    - Share risk
    - Share DD
  - Both: different VC strengths (financial vs. strategic)

# So What Do VCs Look For?

- Committed, experienced management
- Defensible technology
- Growth market (not consultancy)
- Significant revenues
- Realistic sales and marketing plan (VARs and OEMs vs. direct sales force)

# Case Study (2001): DDoS Defense Technology

- DDoS: Distributed Denial of Service
- Web server, router, DNS server, etc. flooded with automated, spurious requests for service at a high rate
- Outcomes:
  - Resource crashes
  - Legitimate requests denied service
  - Bandwidth usage and expense increase
- Attack types:
  - SYN flood
  - ICMP echo reply attack
  - Zombie attacks
  - IP spoofing
  - Continually evolving!
- Attack characteristics:
  - Distributed
  - Statistical
  - Highly adaptive
- Not defendable via cryptography, firewalls, intrusion detection,…
- An arms race

# Market Landscape

- Victims include CNN, eBay, Microsoft, Amazon
- > 4000 attacks per week (UCSD study)
- "Code Red" attack on White House foiled, but > 300K client zombies infected
- Costs:
  - Downtime, lost productivity
  - Recovery costs (personnel)
  - Lost revenue
  - Brand damage
- Attack costs $1.2B in Feb. '00; 2005 market estimate $800M (Yankee Group)

# Who Can and Will Pay?

- Internet composed of many independently owned and operated autonomous networks
- Many subnets embedded in larger networks
- Detecting/defending DDoS requires a minimum network footprint
- Must solve problem "upstream" at routers with sufficient bandwidth to withstand attack traffic!
- May simply trace attack source to network edge
- Target customers:
  - Large and medium ISPs, MSPs, NSPs
  - Large and medium data centers
  - Backbone network providers
  - Future: wireless operators; semi-private networks (FAA, utilities)
  - Making target customers care; cannibalization
- Key points:
  - Problem did not exist until recently on large scale
  - No product available for its defense
  - No historical analysis of market possible (firewall and IDS)

# The Companies

- Four early-stage companies focused specifically on DDoS
- All with strong roots in academia
- Headcounts in 10's; varied stages of funding and BD
- Larger set of potential competitors/confusers:
  - Router manufacturers (e.g. Cisco)
  - IDS and firewall companies
  - Virus detection companies (e.g. McAfee)
- Technology:
  - All four solutions involve placing boxes & SW "near" routers
  - Differing notions of "near"
  - Boxes monitor (some or all) network traffic
  - Boxes communicate with a Network Operations Center (NOC)
  - Key issues:
    - Detection or Defense?
    - Intrusiveness of solution?

# Some Specifics

- Company Detect:
  - Emphasis on detection tools provided to NW engineer
  - Claim more intrusive/automated solutions unpalatable
  - Emphasis on GUI and multiple views of DDoS data
  - More advanced in BD (betas), PR, partnerships
  - More advanced in funding (>>$10M capital taken)
- Company Defend-Side:
  - Emphasize prevention of attacks by filtering victim traffic
  - Box sits to the side of router over fast interface
  - Claim there is a "sweet spot" of intrusiveness
  - Box only needs to be fast enough for victim traffic, not all
  - Don't need perfect filtering to be effective
  - No GUI emphasis; behind in BD; less advanced in funding
- Company Defend-Path:
  - Also emphasizing prevention, but box sits on "data path"
  - Need faster boxes and more boxes (scalability)
  - Concerns over router integration

# Due Diligence

- No company has any revenue yet
- Some have first-generation product available
- All have arranged beta trials with some ISPs
- Have roughly similar per-box pricing model and ROI argument
- Due diligence steps:
  - Repeated visits/conversations with companies: technical, sales strategy
  - Multiple conversations with beta NW engineers
  - Development of financial model for revenue projections & scenarios
  - Compare with firewall and IDS market history: winners & losers, mergers
  - Conversations with previous round VCs: DD and commitment
- In the end, a decision between:
  - More conservative technology with a slight lead in BD and R&D
  - More ambitious technology with less visibility, but a better deal
- Contemplating both investments…
- …then came September 11.

# First Exam
# February 27, 2003

- Reminder: The first exam will be held **in class on Thursday**.
- This exam counts for 25% of your total course grade.
- Past years' exams are available from past years' websites (see links on this semester's course website).