Drafts of reports received by today will receive feedback by 25Nov14.

Any make-up reports submitted by 10Nov13 are marked on the sign-up sheets.
Report notes

• Always date your work. *If it’s on-line it will stay around forever and you don’t want to be embarrassed 10 years later.*

• Have an abstract; objective statement; (decompose); conclusion
  ➢ Good for your organization to state the objective. Have only one in a paper!
  ➢ Good to get on-line readers to go *below the fold*

• If you cite web references, keep a copy on your files. *Web pages may disappear or be changed.*

• When you email something, include your name in addition to the course in the file name. *Makes it easier for me* 
  *Don’t just want a bunch of `CS207report’ files*

1. Why should software be valued? Cost versus value.
4. Income from Sales and Service. Alternate Business models
5. Sales expectations and discounting of future income.
7. Software growth.
8. Legal & forensics
9. The role of patents, copyrights, and trade secrets.
10. IP in a service company, protectable IP, fencing of customers’IP, know-how
11. Life and lag of software innovation.
12. How to grow a software company: organic or by acquisitions
14. Separation of use rights from the property itself.
15. Setting licensing rates.
16. Role of Government
17. Risks when outsourcing and offshoring development.
18. Effects of using taxhavens to house IP. Abolish Corporate taxation?
Startups

• Risks versus leverage
  - VC experience
  - Don’t focus on improving what exists
    - Incremental IP
  - Find what is missing
  - New IP

• Survivorship Bias [McRaney]
  - The Misconception: You should focus on the successful if you wish to become successful.
  - The Truth: When failure becomes invisible, the difference between failure and success may also become invisible.
WWII: The military looked at the bombers that had returned from enemy territory. They recorded where those planes had taken the most damage. Over and over again, they saw the bullet holes tended to accumulate along the wings, around the tail gunner, and down the center of the body. Wings. Body. Tail gunner. Considering this information, where would you put the extra armor? Naturally, the commanders wanted to put the thicker protection where they could clearly see the most damage, where the holes clustered. But Wald said no, that would be precisely the wrong decision. Putting the armor there wouldn’t improve their chances at all. Do you understand why it was a foolish idea? The mistake, which [Abraham] Wald saw instantly, was that the holes showed where the planes were strongest. The holes showed where a bomber could be shot and still survive the flight home, Wald explained. After all, here they were, holes and all. It was the planes that weren’t there that needed extra protection, and they had needed it in places that these planes had not. The holes in the surviving planes actually revealed the locations that needed the least additional armor. Look at where the survivors are unharmed, he said, and that’s where these bombers are most vulnerable; that’s where the planes that didn’t make it back were hit. Taking survivorship bias into account, Wald went ahead and worked out how much damage each individual part of an airplane could take before it was destroyed – engine, ailerons, pilot, stabilizers, etc. – and then through a tangle of complicated equations he showed the commanders how likely it was that the average plane would get shot in those places in any given bombing run depending on the amount of resistance it faced. Those calculations are still in use today.
Economyths

Individual’s view

loss of x is 50%

gain of x is 33% over base

state being assessed

symmetry assumption has limited range

11/16/2014 Gio CS207 fall 2014
Planning: Consistency in plans

When comparing business alternatives
• Give each choice the same chance

1. Temporal consistency
   ➢ Computing versus communication
     ▪ Local versus Cloud in 2012
       ○ Skate to where the puck is going [Gretsky]

2. Discount rate

3. Resource prices
   ➢ Green alternatives
     ▪ Benefits may depend on future price of oil –
       ○ if you assume future price = 3 x now, why not invest in oil instead
Example

*Enterprise SW versus cloud*

[Benioff:2009]

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**SIEBEL enterprise sales force management**

1. Price $1,500 per seat, at 200 users = 300,000
2. $54,000 for support (18%) /year, x 5 = 270,000
3. $1,200,000 consulting for installation = 1,200,000
4. $100,000 admin. personnel/year, x 6 = 600,000
5. $30,000 training / year, x 6 = 180,000

➢ 6 years’ usage

Total = 2,550,000

Note that the customer’s total is >> than the price
Opportunities

• There are big waves where much changes
  1. Introduction of automation into manufacturing
  2. Introduction of data processing in business
  3. Introduction of the Internet into communication
  4. Business and Social networks

• Within a big wave there are many small waves
  1. Management of feedback
     ▪ Product improvement, advertising
  2. Locality of computing
     a. Timesharing - many users use a large computer
     b. Personal computing – local computing is cheap
     c. Cloud computing – remote computing is flexible

All waves create opportunities
Acquisitions

• A common path for
  a. Exit from a startup venture → seller
  b. Growth of a larger company → buyer

• 2 parties at `Arms-length
  1. Willing seller
  2. Willing buyer

  ▪ Assumption here: no funny business
    o Buyer has funded seller, formal/ informal restrictions
    o Selling a non-exclusive license
    o Seller is object of a legal proceedings, as patent suit
    o Seller is bankrupt

➢ Both parties must agree on the value
  ▪ Both parties should understand intellectual property
Growth

• Organic
  a. Product R&D investments
    ➢ New versions
  b. Product Marketing
    ➢ New, broader applications
  c. Fundamental R&D
  d. Trademark promotion
  e. Curiosity-driven R&D ?

• Through acquisitions
  a. Additional products
    ➢ novel – first
    ➢ complementary
    ➢ anti-competitive
  b. Product improvements
  c. IP: Patents ... ➢ as with a.
  d. Knowhow of staff

• Paid for by
  a. Profits on existing products (after dividends are paid out)
  b. New investors: venture funders before / stockholders after going public
  c. Loans Interest on loans up to x can be deducted from taxes
Generalize success

A. Broaden

- Adobe: After WYSIWIG printing
  1. Pagemaker for Page composition
  2. Dreamweaver for Web composition
  3. Photoshop for Image editing

B. Deepen

- Salesforce.com
  - Customer Relationship service on-line
- Force.com
  - Operating system for on-line business applications

IP shared:
1. Customers
2. Marketing
3. Distribution

IP shared:
1. Concept
2. Technology
3. HW Support
4. Analytic SW
Use your income to grow IP: R&D and 25% of business spending

- **Advertising**
  - Google Adwords /Adsense to trigger where ads go
    - Show your ad on top or on the side of a search
    - Show your ad on relevant web pages
      - Charge by show (eyeballs) or click-through
      - Do that until money runs out
      - Allocate among competitors according to money made available
  - Google tools for measuring Google’s ads impact
    - Measurements in other media are ad-hoc
    - Could be disregarded, but still contribute to the perception.

Perceptions is also IP, embodied in trademarks etc.
Customer Segmentation

• Getting a broad market presence is very hard
  ▪ Superbowl advertising: 30 seconds costs $3M
    o Apple 1984: Macintosh
    o Hulu 2009: Internet video player

➢ Find narrow markets that are now not well served
  ▪ Professional groups
    o Use professional magazines
    o Establish credibility through publishing
  ▪ Social networks
    o Participate
  ▪ Health concerns by symptoms or diagnoses
  ▪ Educational specialties
Share IP?
Yes, with care

- Adobe: Reader free; pay for Composer
- XEROX PARC: Smalltalk OO language nearly dead
  - We got C++ instead
- Industry Group: Standards specifications
- Publication in scientific venues ok, limited impact
- Publication in trade journals ok, some impact
- Apple vs Microsoft, Xerox vs all: Look and feel
  Apple had licensed earlier version, without overlapping windows.
  Could protect the trashcan
A license is a right to use IP

- Anything you own, if it can be shared, can be converted to a right.

- Rights are fractional
  1. Rights to use an apartment in your building
  2. Rights to sell your product to, say, hospitals
  3. Rights to sell your product in Asia
  4. Rights to manufacture and sell your product there

  - They can be exclusive or non-exclusive
  - You can set up a controlled foreign subsidiary
    - Better protection for your IP rights and income
Setting License fees

Say you want to delegate sales in Europe to some company EUsales that can do it easier over there

• How do you set the fees or royalties?

  1. You have computed a value of your SW of $1M
     ▪ But without discounting, it is actually $1.6M = \Sigma (due old, slide 5)
     ▪ You will also maintain the SW 1.36M = \Sigma (maintenance cost, slide 12)

     The total due is $3M

  2. You expect the European sales will be 40% of total, 20 000
     ▪ The reason for not discounting is that funds arrive at the same times.

• To earn the same you should charge 1./2. = $150/unit
   ▪ It does not matter how EUsales sells it and what it charges
   ▪ Complexities are required language, interface improvements
Global IP and $ flow

Products that depend on IP are sold globally

• Generating a *US-made* product involves

  1. Conception  At marketing and engineering site
  2. Design  At engineering sites for SW & HW
  3. Manufacturing  In-house or by Contractors
     a) Software  The internet and or copying CDS
     b) Gadgets  Setting up production for inventory
  4. Distribution  Directly, to stores, to wholesalers

• Getting the income from the products involves
  ➢ collecting from sellers
  ➢ transferring funds where needed, & holding profits.
Design & validation in the US

Development, testing in the US and at CFCs

Technical IP Investment

Controlled Foreign Corporation

Manufacturing, CD creation, and Internet

distribution

Product Sales within the US

Product Sales external to the US

Income is taxable

Part of income is due to US contribution & taxable

IP & $ flow in the Hard- & Soft-ware industry
Flow of IP & $ in the financial industry

say: investment bank

1. INYB system experts in the US
   - Design & feedback

2. INYB finance experts within the US
   - Operations of INYB within the US
   - Programming and testing
   - Operations of INYB external to the US
   - Finance experts at INYB site external to the US

3. Service Sales within the US
   - All US Income is taxable

4. Service Sales . external to the US
   - Income due to technical US contribution is taxable
OEM fabricators, US and offshore

Chip and board manufacture
offshore

FCM Products

Offshore Revenue

~60%

US Revenue
~40%

Typical FCM

Flows can be messy
Fabless Chip Manufacturer

One-time Buy-in
IP

6-year royalty tranche

IP:
designs

IP use licensing

documents, knowhow

profit

IP use rights

Cost-share payments

Delaware
FCM-D
Design & development

FCM-I
International Ltd
Isle of Man

Owns

FCM-I
Ireland

FCM-H
BV
Netherlands

US offshore

Cost

Cuts

Flows can be messy
Fabless Chip Manufacturer

11/16/2014
Gio Wiederhold CS207 2013 not covered
Adverting Income

• Advertising  
  25% of business spending

  ➢ Google Adwords /Adsense to trigger where ads go
    ▪ Show your ad on top or on the side of a search
    ▪ Show your ad on relevant web pages
      o Charge by show (eyeballs) or click-through
      o Do that until money runs out
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  ➢ Google tools for measuring Google’s ads impact
    ▪ measurements in other media are ad-hoc
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Perceptions is also IP, embodied in trademarks etc.
Shortly after the Internet was established to serve a broader community of researchers than the ArpaNet, commercial uses started. Advertising, a consumer of a large fraction of revenue from sales, and requiring little tangible presence, was on reflection, an obvious candidate.
1. Audience

Focused

- Salesforce

In front of competitor’s annual sale meetings 3x

1. Fake demonstrators in SF.
2. Give coffee, mugs, rides, literature to attendees in NY
3. Hire all taxis in Nice, give free rides to meeting in Cannes.

Vs. Superbowl?

- Much buzz
- Huge audience
- Your audience?

2. Address overlapping segments

a. Buyers in corporations
b. Users and employees
   - Understand motivations for change
c. Both

3. Logo & name

Essential for branding

Metaphor

Negative?

4. Timing

Have Product ready

- Few bugs
- Clear operation
- Useful
Customer segments

• I tried Spotify to listen to classical music
  ➢ but the ads they interpose seems use the same music they use for all listeners, and are quite jarring when one has just listened to Bach or Mozart.
  ➢ Their selection is also quite trite

Either serve a community well or not at all
• Salesforce.com:
  - $150.-month & user only -- monthly billing
  - Make interface look like Amazon – no training needed
  - Low risk for individual adopters
    ▪ Still a high risk for a changeover in large businesses, where changes are controlled by a risk-adverse IT manager or CIO.
  - Start focusing on small businesses
    ▪ Hard to reach a broad market with little cash
    ▪ Must make a lot of noise
  - Later sales force had to change its initial model
    ▪ Deal with large companies
    ▪ Deal with the Dot-com bust, when many companies failed
  - Business must remain flexible
`Buzz`

Customer and potential customer interaction

• In the relevant community
  ➢ The most powerful sales tool
  ➢ Novelty and quality drive buzz
  ➢ Advertising effect is complementary

• Simple stories for the press
  ▪ Writers look for good guys vs bad guys stories
  ▪ Don’t have time to dig deep
  ▪ Match public events
    ○ Be ready - *security SW when there is a big break-in;* ...

• Direct mail ?
  ➢ Sometimes for a specific off-the-net audience
Example: Adobe events

- 1976 Xerox Parc uses Press language to drive its new Dover laserprinter
- 1978 John Warnock joins Parc
- 1982

Founded by

Postscript

1984/1985

Unix

NexT

Acquisitions:

- MacPNG
- PC

Aldus, Frame

- Mac&PC
- PhotoStyler
- TypeAlign
- OCRsystems

Macromedia

Acrobat

Mac & PC

PhotoMerge → Photoshop Elements

Internal products:

- Acrobat
- ImageReady
- InDesign

11/16/2014

Gio CS207 fall 2014

28
**Growth**

Based on 100 top public SW companies Q1 2009

## Tale of 100 Entrepreneurs

<table>
<thead>
<tr>
<th>Company</th>
<th>Industry</th>
<th>Growth History by Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentor</td>
<td>CAD</td>
<td>Rocket Ship</td>
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<tr>
<td>Adobe</td>
<td></td>
<td>Hot Company</td>
</tr>
<tr>
<td>Microsoft</td>
<td></td>
<td>Slow Burner</td>
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<tr>
<td>Sybase Database</td>
<td></td>
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<tr>
<td>SuperMicro</td>
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<td>Compuware Services</td>
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<td>National Instruments (UK)</td>
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<tr>
<td>Blackbaud [non-profit acctng]</td>
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<tr>
<td>Ciber Consulting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality Systems [med.offices]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Categories

• Rocket Ship: 28%
  - Autodesk, Electronic Arts, Interwoven → Autonomy, Sybase, Novell
  - Adobe (Xerox Parc), McAfee (Lockheed), Salesforce (Oracle)
    had substantial IP headstarts

• Hot Company
  - Microsoft, Oracle

• Slow Burner
  - SPSS, Ciber inc Consultants, Quality Systems

• Missing
  - Macromedia, acquired by and now incorporated in Adobe, .....
  - Google (does not sell Software)
Rocketship list
3-6 years to $50M Rev.

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Activision Blizzard Inc</td>
<td>1979</td>
<td>4</td>
<td>$3,026m</td>
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<td>Adobe Systems Inc.</td>
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<td>China Digital TV Holding Co., Ltd.</td>
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<td>Taleo Corporation</td>
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<td>Verisign, Inc.</td>
<td>1995</td>
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- Net income is convoluted due to acquisitions, write-offs, etc.
<table>
<thead>
<tr>
<th>Company</th>
<th>Year Founded</th>
<th>Years to $50m</th>
<th>Revenue (2008)</th>
<th>Net Income (2008)</th>
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<tr>
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</tr>
<tr>
<td>Sourcefire, Inc.</td>
<td>2001</td>
<td>7</td>
<td>$76m</td>
<td>($6m)</td>
</tr>
<tr>
<td>SuccessFactors, Inc.</td>
<td>2001</td>
<td>7</td>
<td>$112m</td>
<td>($65m)</td>
</tr>
<tr>
<td>Super Micro Computer, Inc.</td>
<td>1993</td>
<td>9</td>
<td>$541m</td>
<td>$26m</td>
</tr>
<tr>
<td>Symantec Corporation</td>
<td>1982</td>
<td>8</td>
<td>$5,874m</td>
<td>$464m</td>
</tr>
<tr>
<td>The Ultimate Software Group, Inc.</td>
<td>1990</td>
<td>9</td>
<td>$179m</td>
<td>($3m)</td>
</tr>
<tr>
<td>Websense Inc.</td>
<td>1994</td>
<td>9</td>
<td>$296m</td>
<td>($30m)</td>
</tr>
</tbody>
</table>
### Slow Burner list

**13-30 years to $50M Rev**

<table>
<thead>
<tr>
<th>Slow Burner</th>
<th>Year Founded</th>
<th>Years to $60m</th>
<th>Revenue (2008)</th>
<th>Net Income (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advent Software, Inc.</td>
<td>1983</td>
<td>15</td>
<td>$264m</td>
<td>$19m</td>
</tr>
<tr>
<td>ANSYS, Inc.</td>
<td>1970</td>
<td>26</td>
<td>$385m</td>
<td>$82m</td>
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<tr>
<td>Blackbaud, Inc.</td>
<td>1982</td>
<td>17</td>
<td>$303m</td>
<td>$30m</td>
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<tr>
<td>CIBER, Inc.</td>
<td>1974</td>
<td>20</td>
<td>$1,192m</td>
<td>$30m</td>
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<tr>
<td>Deltek Inc.</td>
<td>1983</td>
<td>15</td>
<td>$289m</td>
<td>$24m</td>
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<tr>
<td>EPIQ Systems, Inc.</td>
<td>1988</td>
<td>16</td>
<td>$236m</td>
<td>$14m</td>
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<tr>
<td>Macrovision Solutions Corporation</td>
<td>1983</td>
<td>17</td>
<td>$330m</td>
<td>$21m</td>
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<tr>
<td>MICROS Systems, Inc.</td>
<td>1977</td>
<td>14</td>
<td>$954m</td>
<td>$101m</td>
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<tr>
<td>MSC Software Corp.</td>
<td>1963</td>
<td>25</td>
<td>$247m</td>
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<td>National Instruments Corp</td>
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<td>14</td>
<td>$740m</td>
<td>$107m</td>
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<tr>
<td>OPNET Technologies, Inc.</td>
<td>1986</td>
<td>17</td>
<td>$101m</td>
<td>$1m</td>
</tr>
<tr>
<td>Pegasystems Inc.</td>
<td>1983</td>
<td>15</td>
<td>$162m</td>
<td>$7m</td>
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<tr>
<td>Quality Systems, Inc.</td>
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<tr>
<td>Quest Software, Inc.</td>
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<td>$735m</td>
<td>$68m</td>
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<td>Renaissance Learning, Inc.</td>
<td>1986</td>
<td>13</td>
<td>$108m</td>
<td>$8m</td>
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<tr>
<td>Retailix Limited</td>
<td>1982</td>
<td>20</td>
<td>$221m</td>
<td>($1m)</td>
</tr>
<tr>
<td>SPSS Inc.</td>
<td>1975</td>
<td>14</td>
<td>$303m</td>
<td>$36m</td>
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<td>Synaptics, Incorporated</td>
<td>1986</td>
<td>15</td>
<td>$361m</td>
<td>$31m</td>
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<td>TeleCommunication Systems, Inc.</td>
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<td>13</td>
<td>$220m</td>
<td>$58m</td>
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<td>VancelInfo Technologies Inc.</td>
<td>1995</td>
<td>13</td>
<td>$103m</td>
<td>$16m</td>
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<tr>
<td>VASCO Data Security International</td>
<td>1991</td>
<td>15</td>
<td>$133m</td>
<td>$24m</td>
</tr>
<tr>
<td>Wind River Systems, Inc.</td>
<td>1983</td>
<td>14</td>
<td>$329m</td>
<td>($2m)</td>
</tr>
</tbody>
</table>

*All smaller*
Eugene Miya, retired from NASA, monitored Government contracts for NASA, NSF, DARPA

Government

3 branches: legislative, judicial, executive
repeated at federal, state, local levels.
Most people and needs are in the executive branches.
Discussion:
Role of Government

*We are all part of the government*

The Government giveth and payeth -

- most SW work done by contractors: large fraction of their income

- **Rigid acquisition rules**
  - No flexibility as times and needs change
  - no ability to innovate, iterate to a desirable, but vague goal
  - lowest cost bid preferred – huge incremental costs

- **Single copy software for NASA, military**
  - attempts to use Commercial-of-the-shelf
  - very high precision computation, possible, but different
  - reliability required, few in-flight fixes possible