Admin notes:

• New Sign-up sheets – prior entries will been transferred
• miss a class? write & mail me a brief report by 17 Nov.

• Subject for a missing class report:
  • 3:15 PM - 04:15 PM Class: How Corporations Systematically Influence US Government, Professor Stephen Barley in the new Huang Center
Write an initial statement on the issue you are addressing. Having it in front to you will help you focus. You can share it with me for feedback.

Then make a list of candidate documents. You could Google for likely documents and use the attached to the CS207 wiki page.

From the list select say 10-25 papers. Read the ones that seem significant.

Make notes of their assumptions and results, be critical. Folk that advocate a specific point-of-view often forget or ignore important factors.

Combine those notes into your report, with citations.

Add a brief intro and a conclusion. Use your initial statement for the intro. The conclusion will tell me -- and the world on the web -- what you have learned.

The value of your work is the clarity of your point. Don’t worry about the length; it is harder to be brief than voluble.
Syllabus:

1. Why should software be valued?
2. Open source software. Scope. Theory and reality
4. Market value of software companies.
5. Alternate business models.
7. Life and lag of software innovation.
8. Sales expectations and discounting.
9. The role of patents, copyrights, and trade secrets.
10. Licensing.
11. Separation of use rights from the property itself.
12. Risks when outsourcing and offshoring development.
13. Effects of using taxhavens to house IP.
Example revisited

Software product

- Sells for $500/copy
- Market size 200 000
- Market penetration 25%
  - Expected sales 50 000
  - Expected income $25M
  - Discounted gross income $14.7M
  - Available for SW maintenance $3.7M

Ok but see when it is needed

10/16/2010

Gio: CS207
Combining it all
corrected see spreadsheet

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Result of Example

• Selling 50,000 SW units at $500 \approx $1\text{M}
  not $25\text{M}

Once its in a spreadsheet, the effect of the many assumptions made can be checked.
When assumptions later prove unwarranted then management can make corrections.
To be wise, don't spend more than \approx $500,000 to develop the software product.
Transients due to versions

Customer behavior w.r.t. new versions, superimposed on basic sales curve

Overall steady state sales

New version announced
New version release
New version announced

2-year version life

Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1
Income Factors

1. Business overhead takes 50% of net revenue
   - An average, when sales are low, fraction is higher
   - Be lean, especially when sales fall
   - Focus on on-line sales

2. Marketing uses 25% of net revenue
   - Assess customer base, but don’t skimp here

3. Available for maintenance is still 25% of net
   - Enough once sales become substantial
   - Requires additional capital initially
Guidance obtained

• We applied an overall Erlang sales curve
  ➢ new versions keep market going but customers do not replace earlier versions

• The assumption are sufficiently simple that alternatives can be intelligently discussed
  1. keep development costs low
  2. design so that SW maintenance is low
  3. charge a higher price
  4. minimize sales cost, without reducing market size
  5. broaden the market
  6. or →
Business models

0. New versions do not replace earlier versions

Alternative business models

1. New versions encourage replacement
2. Provide related services
3. Charge for maintenance
   Lower initial cost, slower income stream
4. Make product Open source to broaden market
   Charge only for services
Alternate business model

Consider maintenance and its income

"Service model"

• More assumptions — now include cost @50% of value

1. Original cost $500 000 (used to estimate 2.)
   a. Maintenance cost 15%/year of aggregate original cost
   b. Maintenance fee 15%/year of original price, 1 year delay.
   c. 85% annual retention of customers.

2. Maintenance Lag = Δ (t cost , t income) = 1 year

3. Stop maintenance when cost > income
## Additional Effect of service model

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### Assume designed for maintenance

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- **Total** = 4348 ≈ $4.3 million >> sales only but $1523M for maintenance

Cost of maintenance = 1523/(500+1523) = 75% of total

10/16/2010 Gio: CS207
Lag delays benefits of R&D investments

Gestation period

Effort →

Ongoing Development
(5% increase in personnel)

Mature company

~37% →

Simple Model

@27.4% →

Testing

~14% →

Startup

35% →

Research

Development

Gio: CS207
Service model factors

- Same proportion was used for SW contribution: 25%
  - Maintenance income has lower sales cost, perhaps more should be made available for software improvements

- Discount total only after maintenance cost
  - Income comes at time of spending

- Maintenance fees still generate substantial income
  - Organize business sector to collect those in out years
  - Use excess SW income for replacement or new products

- Continue longer, but stop in time!
  - When maintenance costs more than income
### More years of service model?

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- Less, out year losses because $5687M spent on maintenance
- Good time to quit
- But still have income to v12
- Quit: reduce expense & income 1/3 each year

10/16/2010 Gio: CS207
Total income vs technical cost
Net income, after sales cost

End of profit on sales

End of profit on all income
All Graphs

Incomes: gross, net, and after cost (-cost)

Total gross revenue

Gross sales revenue for Erlang $m=12$ assumption

Maintenance revenue

Income < unadjusted cost

10% × max

Maintenance costs

sales < costs

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Life of Software

We learned now why software has a finite life
Although SW can be indefinitely maintained

Eventually the maintenance costs exceed income

• A very well-selling product can have a long life
  1. Unique
  2. High quality
  3. Well maintained

• An easy to maintain product can have a long life
  1. Well designed
  2. Insulated from change by established standards
Companies that

1. develop & sell software → *
   • Basis of IP: income from sales

2. purchase & license software for internal use
   • Do not generate IP with software

3. develop software internally for their own use
   • Basis of IP: relative SW expense × all income

4. combinations
Allocation

- When there are multiple products
- When there are other contributors to income
  - Substantial hardware
  - Financial consultants in financial firms
  - Experts in call centers
  - Brand name
  
  Not all of the income can be allocated to the software
- Pareto Optimum
Pareto Optimality

The point were any change lowers the total

• Spending more on software will have less benefit than spending on other stuff
  ➢ People
  ➢ Hardware
  ➢ Advertising
    ▪ For large 10 IT companies the average value allocated to their brand name is 22% (BW survey).

Conclusion:

• If a company is managed optimally, we can allocate IP contribution by multi-year spending patterns
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 = Σ(due old, slide 5)
     ▪ You will also maintain the SW 1.36M = Σ(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
Discussion

• Many choices now
  a. Technical
  b. Business

Interact with each other.