CS207 #2, 7 Oct 2011

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Complementary Directed Reading Projects:

1. define the topic you'd like to study and email me a brief memo.
I can either provide readings then or we can discuss it further by appointment

2. Sign up for a directed reading course at your level (UG or Grad) in EE or CS.
Use my Directed course Section Id, either 17(CS) and 65(EE).
The number of units should be about the (number of hours/week you plan on) / 4.

3. Draft due 19 Nov. Feedback from me 25 Nov. Final report due 2 Dec.2010

4. Topics later today. <lost message>

Syllabus:

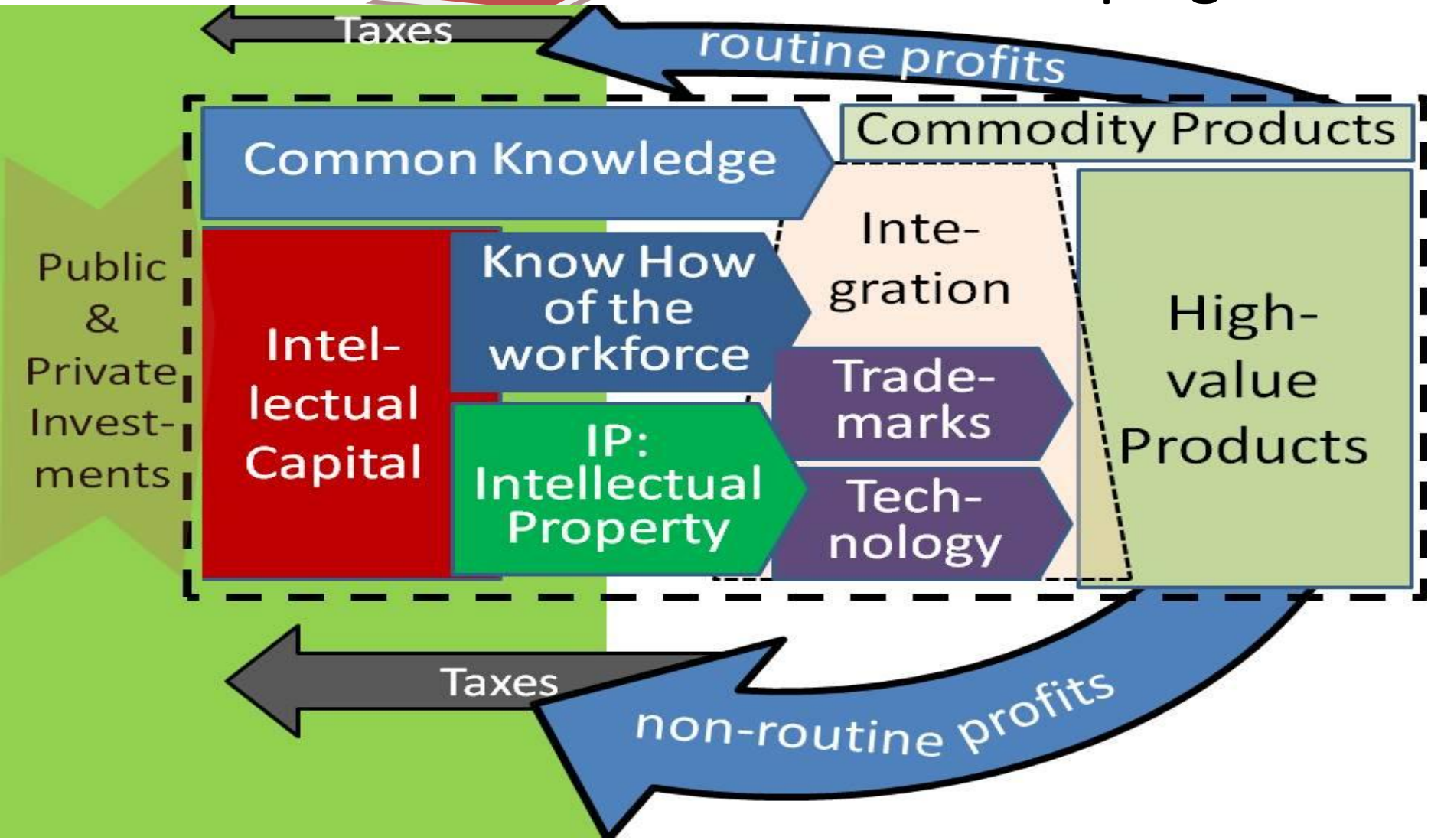
1. Why should software be valued?
2. Open source software. Scope. Theory and reality
3. Principles of valuation. Cost versus value.
4. Market value of software companies.
5. Intellectual capital and property (IP).
6. The role of patents, copyrights, and trade secrets.
7. Life and lag of software innovation.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

Review: Knowing what software is worth

- Allows rational design decisions, as
  - Allocating development efforts
  - Programming investment for long-lived SW
  - Understand limit to Software Life
- Allows rational business decisions, as
  - Choice of business model
  - Where and when to invest
  - How to assign programming talent

- Improve focus of education in software
  - Consider quality, not just quantity in assignments
  - Effectiveness of curriculum

Economic Loop again



Value

Profit margins are the excess left after

CoGS [Cost of Goods Sold] and business costs

(*SG&A*, *capital cost*, *tax*) are are deducted

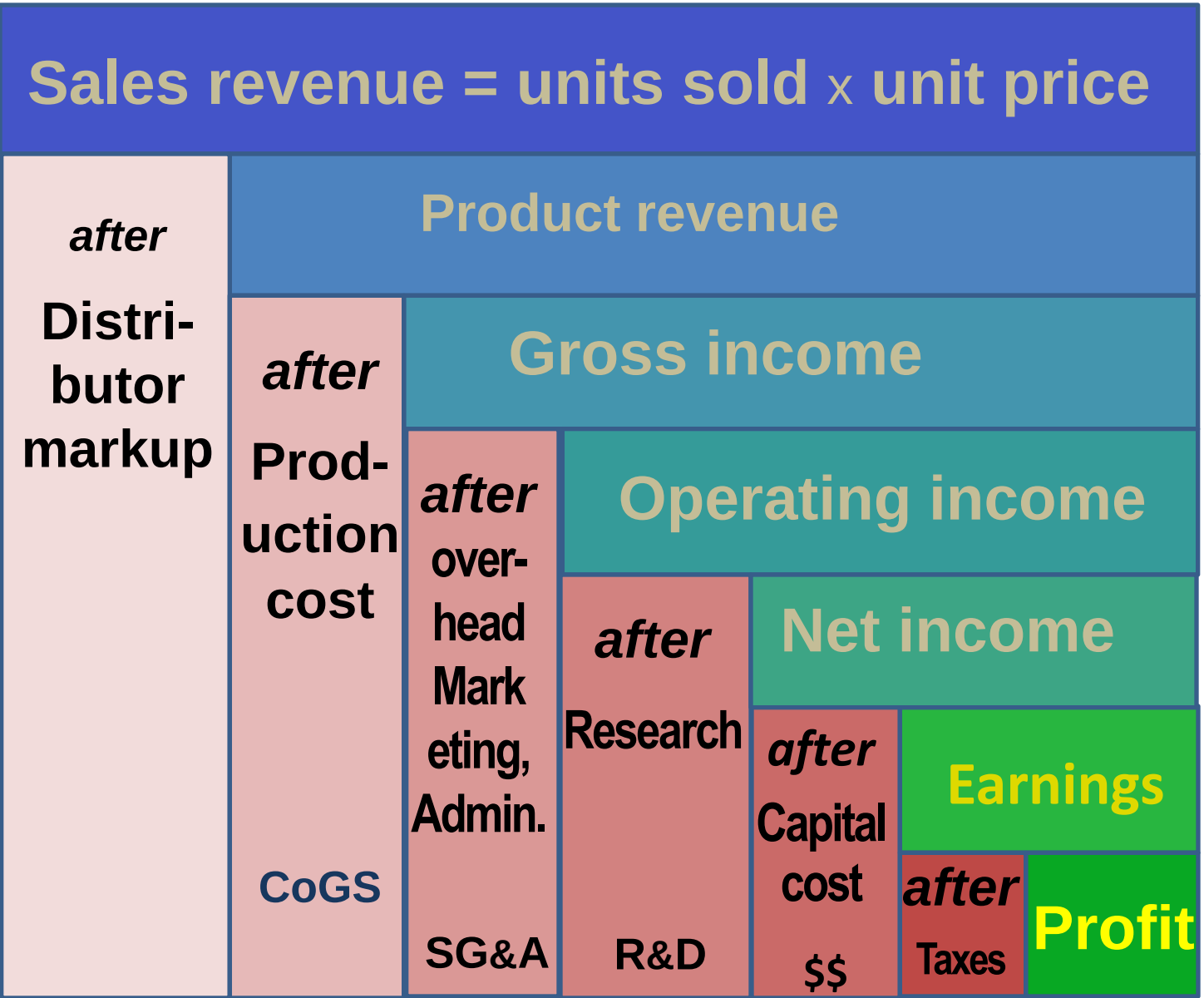
Low for SW

Conclusion from last week

- If goods are sold based on their manufacturing cost, there is no accounting for the value added due to their uniqueness.
- If anyone can compete profit margins will be modest.

- Uniqueness has value because it raises profit margins
- Uniqueness in software in not a tangible

Examples → Income allocation



Gad-get	Soft-ware
525M 140%	525M 162%
375M 100%	325M 100%
284M 76%	300M 92%
250M 67%	225M 49%
164M 44%	160M 42%
154M 41%	154M 47%
100M 27%	100M 31%

Quick definitions: Intangibles

In a business there are 3 parts that have value

(Contribute to potential income)

1. **Tangible goods**: buildings, computers, working capital
2. The **know-how** of management & employees
3. **Intellectual property**: Software, designs, methods, etc.

- 2. + 3. make up the **Intangible Capital** of a company.

- Software is an intangible good

  If it is ***owned*** then it is **I**ntangible **P**roperty

Intangibles

- Product of knowledge

Cost of original >> cost of copies

1. Books
2. Software
3. Inventions
4. Trademarks
5. Knowhow
6. Customer Loyalty

➢ *Interacts with long-term quality*

Ever
Even
Less
Tangible

by

authors
programmers
engineers
advertisers
managers

Ownership

Claimed via

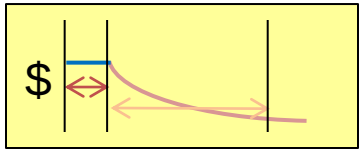
3. Patents
2. Copyright
1. Trade secret

More on those issues another day

Approaches to assess IP

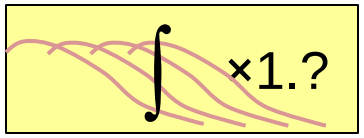
- Technical alternatives
  1. Income Prediction

     Based on expected sales, life, lag



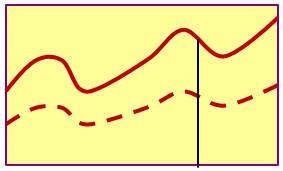
  2. R&D roll-over

     Based on life and effectiveness of R&D



- Broader alternative approaches
  3. Market capitalization (Market Cap)

     Covers everything the shareholders value



  4. Comparisons with another existing businesses

     With other companies based on industry, operational similarity and then check their performance based on ratios

     royalties gathered, costs/earnings (price/earnings needs market cap)

Fraction of intangibles

- **Principle**

  The sum of all future income discounted to today (NPV)

  Implicitly estimated by shareholders through the market cap

- Example: Market Cap value of a company *(SAP, 2005)*
  - Largely intangible – like many modern enterprises

    1. Market cap = share price × no. of shares €31.5B 100%
    2. Bookvalue = sum of all tangible assets € 6.3B 20%
       Equipment, buildings, cash
    3. **Intangible** value per stock market €25.2B 80%

    Intangible/tangible = 4 x

  - How much of it is software at *SAP* ?

Basis for SW value as of today

- Sum of future income
  - Sales = price x copy count
  - Maintenance fees if service subscription
- Minus sum of future costs
  - Cost of goods sold
  - Cost of marketing
  - Cost of doing business
  - Cost of maintenance
- Discounted to today
  - To account for value of money and risk

Independent of cost

Discounting

- Standard economic accounting principle

Getting $1 next year is less valuable than getting $1 today.

1. *If no risk of getting it later, discount by available interest rate*
   - *Say 4%, 1-year off is $0.96, 5-year is $0.855, 15 year only $0.542*
   - Formally, use Federal bonds rates for that period
2. *If there is a risk - likely in business – use risk experience*
   - *Say 15%+4%: 1-year is $0.81, 5-year is $0.349, 15 year only $0.042*
   - Tables per industry are available (at a price), based on past experience

Discounting has a large effect on income estimates

Makes looking into the future less risky

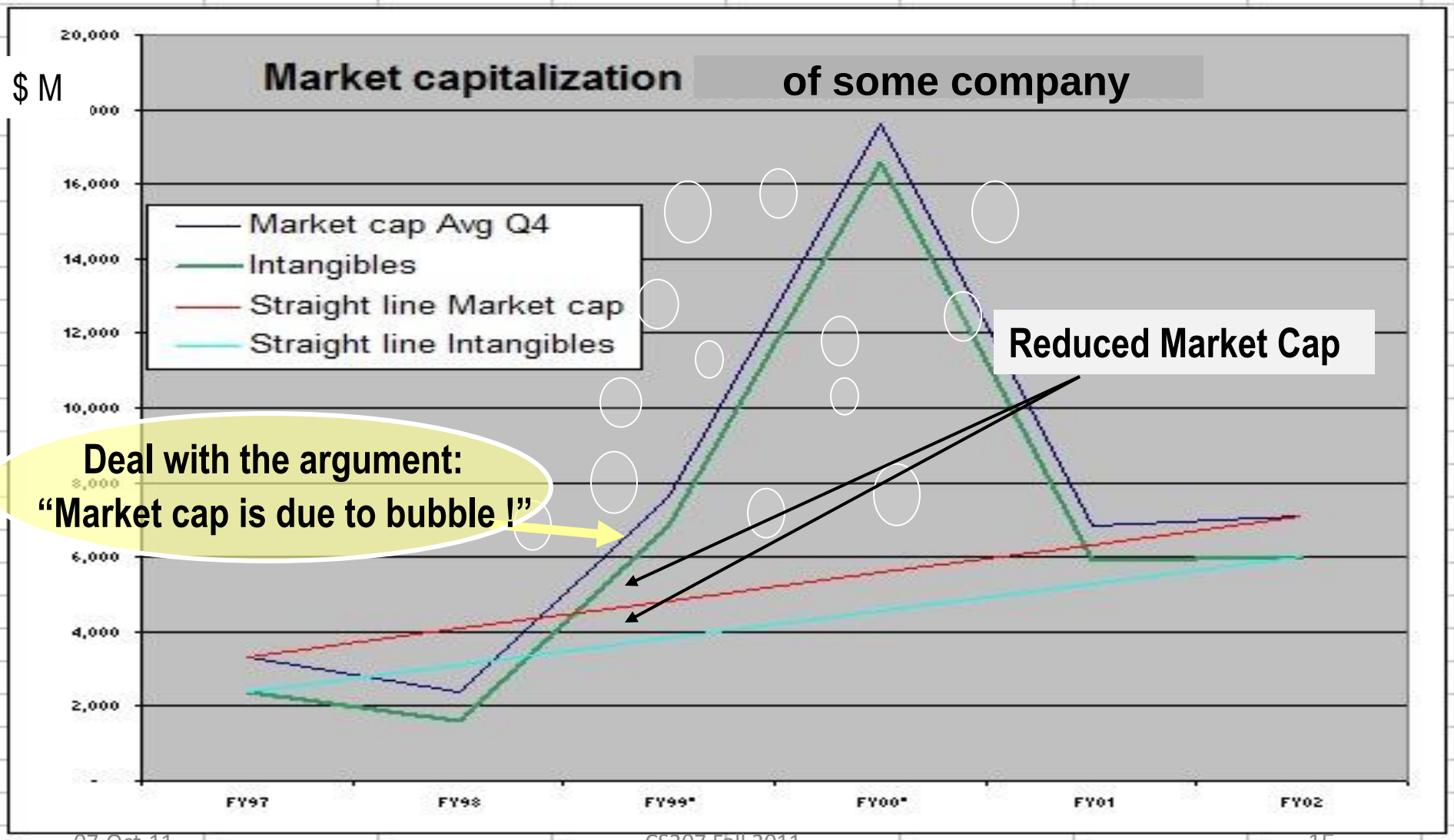
Market cap : only a hint

Issues

- Stockholders don't know what is really going on
  - Wisdom of the masses?
  - Are fed limited information
  - Indirect indicators are delayed: sales by principals
- Market cap is unreliable due to high variability
  - Market bubbles mislead
  - Option values are hard to judge
- In a multi-product company
  - Allocate income to each product line

Over time, many factors should even out

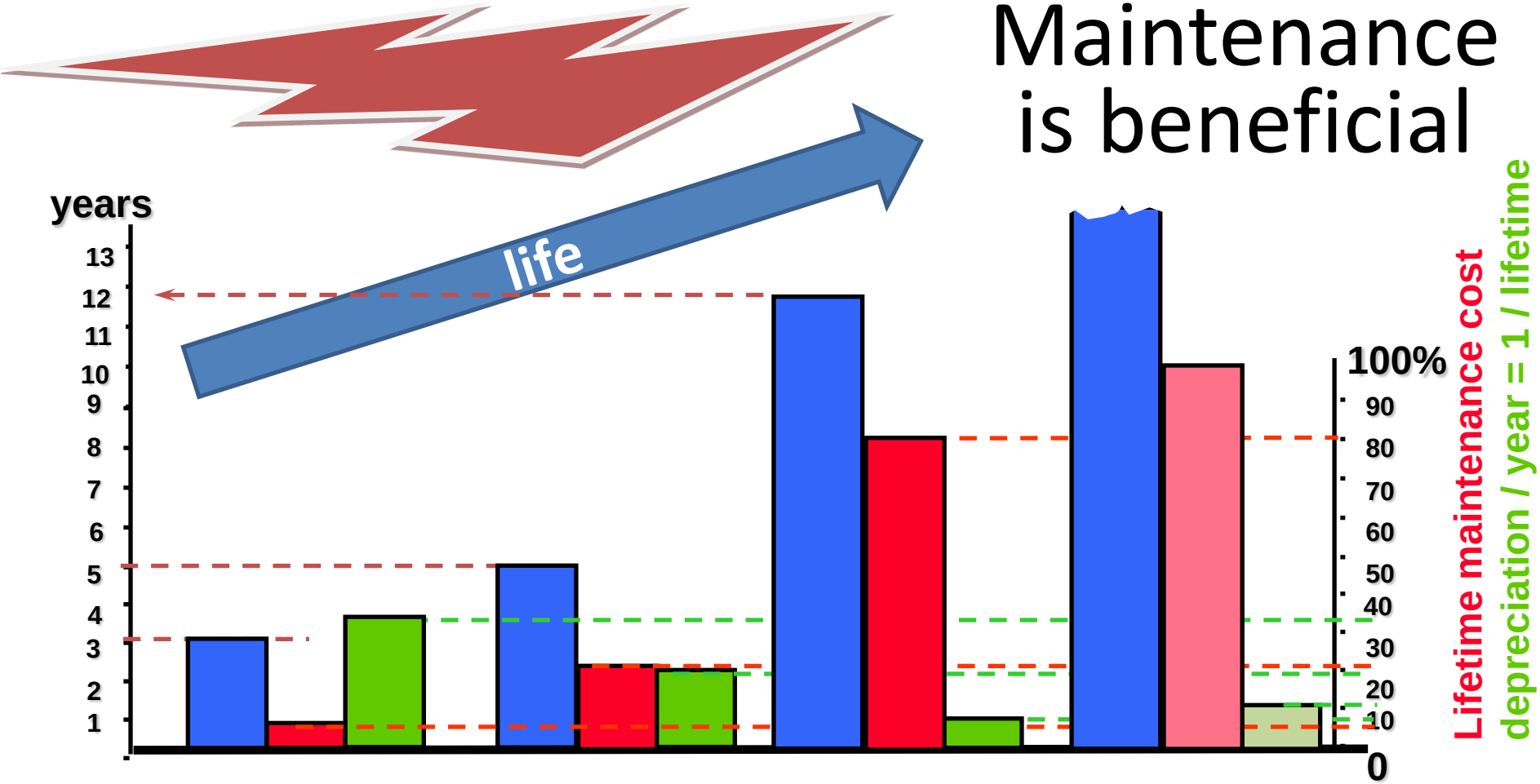
For that hint: Adjust market cap



A better, direct approach

- Value the software specifically by income over its lifetime
- But software is not stable over time: *Slithery*
  - Getting long-term income requires maintenance
  - Maintenance enables long-term income
- Much more so than other intangibles
  - Books, music,
- Similar to some intangibles that contribute to life
  - Costumer loyalty, trademarks

Maintenance is beneficial



	PCs	cars	software	intangibles
Typical Life	3years	5 years	12 years	18 years
Maintenance	2%/year	5%/year	15%/year	13.75%/year
Maintenance cost	6%	21%	80%	most over asset life
Depreciation	33/y. linear	20%/ y. linear	8%/y. linear	12% geometric

Software is slithery !

Continuously updated

1. Corrective maintenance

   bugfixing reduces for good SW

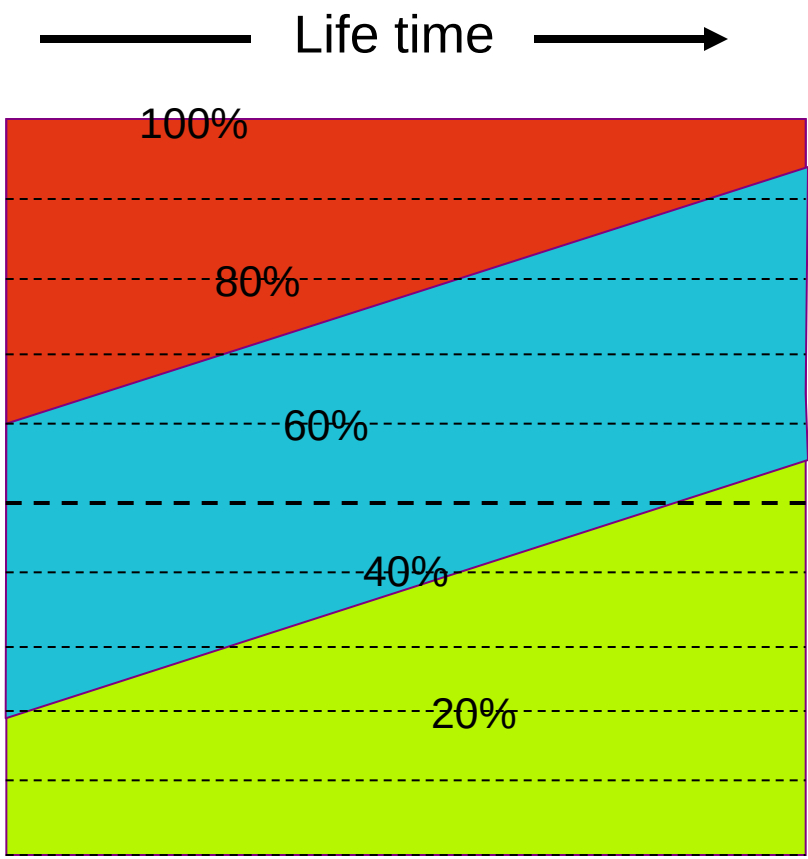
2. Adaptive maintenance

   externally mandated

3. Perfective maintenance

   satisfy customers' growing expectations

[IEEE definitions]



Ratios differ in various settings

Topics for paper

- Something your are interested in / wondering about
- Value in Apple
- Value in Microsoft
- Value in Google
- Value in Facebook
- Value in a company you plan to start
- Value of education when starting a company
- Company failures -- real or potential (HP)
- Accounting for intangibles
- 9% income + 9% corp.+ 9% sales tax [Cain]

Next Class

- Cost of maintenance resources needed
- Combine it with income
  - Estimate sales
- Subtract costs
  - Sales etc
- Discount it all
  - life if well-maintained
- Estimate current value