CS207 #6, 1 Nov. 2013

Gio Wiederhold
Hewlett 103
Homepage at
https://cs.stanford.edu/wiki/cs207/Main/HomePage
Syllabus:

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

, Vishal Sikka CTO of SAP

• Focus on personnel
  ➢ Largest cost item in a high-tech company
  ➢ Represents the creative part of intellectual capital

• Software is the primary Intellectual property
  ➢ Generated by people
  ➢ Consumed by people internally
  ➢ Embedded in
    ▶ products sold
    ▶ services rendered
Discussions

Vishal Sikka, CTO SAP

• Importance of the workforce
  ➢ creates, maintains, exploits IP
  ➢ How to
    ▪ Attract
    ▪ Motivate
    ▪ Update
    ▪ Keep
    ▪ Reduce
Partnership

Charles Adelberg: IRS economist

- **Large companies**
  - post-war growth of integrated software companies
  - long-lived, rigid, incremental maintenance
  - focus on growth by financial parameters

- **Startups**
  - innovative, ad hoc
  - management transfer
  - Venture funders expectation

- **Partnership**
  - sell their IP/ company to larger ones
  - exit strategy
  - failures of integration
Staff Growth: Linear
Effort total = \( \frac{1}{2} E \times T \)
A simple metric: lag vs completion =
Centroid of prior expenditure
here @ 33% (without discounting)
Timing of Expense & income

capitalization of cost allowed under GAAP

Distribution to Sales

distribution delay

Sales lag

Marketing lag

development lag

development done

Release to Production (RTP)

Sales

Centroid of total development cost

Research, Design, Implementation

Testing

Development done

Centroid of pre-sales marketing costs

part of investment: IGE

Centroid of post-sales marketing, part of sales cost: CoGS

Post-sales marketing

expenses

Release to Production (RTP)

Development done

Centroid of total development cost

Research, Design, Implementation

Testing

Development done

Centroid of pre-sales marketing costs

part of investment: IGE

Centroid of post-sales marketing, part of sales cost: CoGS

Post-sales marketing

expenses

Timing of Expense & income

Capitalization of cost allowed under GAAP

Distribution to Sales

Sales lag

Marketing lag

development lag

development done

Release to Production (RTP)

Sales

Centroid of total development cost

Research, Design, Implementation

Testing

Development done

Centroid of pre-sales marketing costs

part of investment: IGE

Centroid of post-sales marketing, part of sales cost: CoGS

Post-sales marketing

expenses

Timing of Expense & income

Capitalization of cost allowed under GAAP

Distribution to Sales

Sales lag

Marketing lag

development lag

development done

Release to Production (RTP)

Sales

Centroid of total development cost

Research, Design, Implementation

Testing

Development done

Centroid of pre-sales marketing costs

part of investment: IGE

Centroid of post-sales marketing, part of sales cost: CoGS

Post-sales marketing

expenses
SW Lags

Development done → General availability

Costs

Research, Implementation & Testing
deviation lag includes testing

Pre-sales marketing costs

Marketing

Sales

RTP
GA

Sales lag

Centroid of revenue

time →

5-Nov-13

CS207
Lag delays benefits of R&D investments

Ongoing Development (5% increase in personnel)

Mature company

~37%

Simple Model

@27.4%

Testing

~14%

growth limit

Research

Development

Startup

Estimate effective lag

growth limit

Gestation period →

11/5/2013

Gio: CS207
A startup is unlikely to ramp up linearly

Use exponential growth, exp 0.025

Assume

1. 12.5% research
   Given that idea is clear, only towards for implementation

2. 25.0% testing
   Minimal and risky

3. 67.5% left for implementation
   - Overlap research and implementation until testing starts
   - Overlap implementation and testing until RPS

Results

Overall centroid @ 0.27 before RPS -- later
Research from 1.00 to 0.33, centroid @ 0.65 before RPS
Implementation from 0.67 to 0.00, centroid @ 0.29 before RPS
Testing from 0.17 to 0.00, centroid @ 0.08 before
Hiring rate at RPS 21%, at the limit for effectiveness

Ignore different staff salaries
Development in mature company with
12.5% research and
25% testing effort,
62.5% implementation

Res., Imp, & Test @0.42

Research ends when
65% time remains

Implementation starts when
85% time remains

Values based on finite integration, exp= 0.05

5% company staff growth

38% effort growth at start

Available resources

Testing starts when
40% time remains

Release to sales

0 25% 50% 75% 100%
Relative Effort

1.00 0.75 0.50 0.25 done
Values

5-Nov-13
CS207
New considerations

1. Have staff already
   a. Early versions rapid growth, but observe ~20% limit
   b. Later, best grow slower

2. Can overlap version development
   a. Don’t let valuable staff be idle
   b. Missing features should already be understood
   c. Rapid analysis of problems to allow next version fixes
   d. Any research should be done before major staff effort

3. Adequate testing to keep reputation
2nd version technical lag

Staff becomes available when prior version enter testing

Rapid, 33% increase in personnel per version interval

25% Testing for version $n$ Starts at 0.057

Research for version $n$ release

Implementation for version $n$ release

Research & Implementation

Release version $n-1$

Release version $n$

Relative Effort

30% increase in personnel per version interval

Done

Version $n$ development interval

5-Nov-13

Gio: CS207 Fall 2013
2nd Version
substantial testing

Staff becomes available when prior version enters testing

5-Nov-13
CS207
16
Mature ongoing technical lag

Staff becomes available when prior version enter testing

Research & Implementation for version $n$ release

Overall @ 0.63

25% Integration and Testing @ 0.21

Delivery of version $n$
1. Determine type of development
   a. Startup
   b. Simple
   c. Mature
   d. Ongoing?
2. Determine interval of development
3. Does testing contribute to IP?
4. Determine growth of personnel effort

Lag, because it precedes IP diminution, has a large effect on economic valuation
Effort total = 8.6 x original effort
Test ratio: 37%
First to market advantage

Competition (drawn to scale)
Growth Rate 20%/year average
Effort total = 5.4 units

Competition/ Original multi version source
Effort ratio R/O = 0.63
Time ratio \( \frac{t(R)-s(R)}{t(O)-s(O)} \) = 0.41
Effective Lag ratio = 0.23

But at that point the original is 3.5 versions ahead of the competition!
Discussion

• A long-lived product is hard to displace if
  ➢ It is well maintained,
    ■ but that becomes costly
  ➢ Keeps up with all standards

• Internal replacement
  ➢ Should be easier
    ▪ But has not been in practice
Managing & Evolving A Large Software Workforce
A SAP Case Study

Dr. VISHAL SIKKA
MEMBER OF THE EXECUTIVE BOARD  |  SAP AG

November 1, 2013
SAP - A Global Leader in Providing Software Solutions to Businesses

World’s 3rd Largest in Software
98% of the 100 most Valued Brands

251,000 Customers in 120 Countries
20% Large Enterprises, 80% SMEs

SAP Share of Forbes 2000 Companies by Sector
88% Consumer Products        96% Discrete Manufacturing
87% Energy & Nature Resources  82% Financial Services
100% Public Services          84% Services

16.3B EUR Revenue in 2012, 92.75B USD Mkt Cap on Nov.1, 2013
66,061 Employees, €250K Revenue/FTE
SAP’s growth in revenue and margin

SAP Revenue and Operating Margin
2002-06 US GAAP, 2007-13 non-IFRS in M€ and %

- Year
  - 2002
  - 2003
  - 2004
  - 2005
  - 2006
  - 2007
  - 2008
  - 2009
  - 2010
  - 2011
  - 2012
  - 2013

- SAP Revenue (B€)
  - 7.4
  - 7.0
  - 7.5
  - 8.5
  - 9.4
  - 10.2
  - 11.7
  - 10.7
  - 12.5
  - 14.3
  - 16.3
  - 16.8

- SAP Operating Margin

1) Rolling 4 Quarter ended Q3 2013
Evolution of Revenue Growth

- **Growth driven by:**
  - HANA
  - Cloud
  - New Applications

- **Growth contributors by:**
  - HANA
  - HANA-based applications
  - Mobile

1) Rolling 4 Quarter ended Q3 2013
2) High-level guidance
Software Revenues, and People distribution by key categories

**Software Revenue Mix**
(in %)


**Headcount Allocation**
(in %)

- Applications/CD
- Tech & Middleware
- Analytics
- Mobile
- Cloud
- Database
- Other Functions

1) 2013 Rolling 4 Qtr  Source: SAP
Driving Changes at SAP

Product Transformation
- Portfolio diversification from Applications to include Analytics, HANA/Database, Mobile and Cloud
- Product renewal and new products on HANA
- Intellectual renewal from standard packaged application development to customer co-innovation,

People & Skill Transformation
- Knowledge and skills are changing from legacy development to now include HANA, Cloud, Design
- Organic investment for HANA, Design & User Experience, New Application
- Acquisition brings in new diversity and new ways of work

Business Model Transformation
- Edge Applications demand from Cloud → SFSF, Ariba, CRM, Hybris, etc
- Educating sales force and services to deliver innovation to customers and at the same time to determine new, low cost, routes to market
- Niche players are able to reach scale in short period
- Customer and end users are expecting transformation of core business
Products & Innovation Overview

Total 21,000 employees

Platform
- HANA
- Frontend
- Deployment/marketplace

Applications
- Core Suites
- Cloud
- Custom Dev.

Culture
- Renewal – Tool, methodologies, processes, culture
- Architecture, Communication, Education, Security
- Operational Excellence

Americas: 22% | EMEA: 46% | APJ: 32%
To enable this growth, the R&D Board area massively shifts resources from low- to high-growth areas each year.

### Development capacity in FTE

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2009</th>
<th>2010*</th>
<th>2011</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisitions</td>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lift (freed up)</td>
<td>5,474</td>
<td>5,686</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shift within TIP</td>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Growth</td>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resources freed up for new projects.
Strong Adoption of HANA – New Investment Paid Off

# of HANA Customers

HANA SW Revenue in M€

Year

- 2010: 2
- 2011: 158
- 2012: 392
- R4Q Q3, 2013: 522

Revenue in M€:
- 2011: 236
- 2012: 1011
- R4Q Q3, 2013: 2252
The HANA Effect

Massively Parallel, In-Memory, Columnar DB | Rethought Platform
OLTP + OLAP | Structured + Unstructured | Legacy + New | Enterprise Readiness + Scale

3.5B scans /s /core | 15M aggregates /s /core | 1.5M inserts/s
2.5TB /hour Data Services | System Replication + HA | Memory Failure Recovery

HANA Platform | HANA Cloud Platform
HANA ONE | HAAS | HANA Enterprise Cloud
AppHaus – rethinking our workspace

Los Altos | Bangalore | Shanghai | Dublin | Waterloo | Ra’anana | Singapore | Potsdam

... and recently, Palo Alto
Outlook

Our Three Imperatives

Building on HANA’s Success, Abilities & Potential, We Must Radically Improve the Experience of Software Developers & End-Users

And Deliver Applications & Experiences that help to Sustain, Advance & Power The World With Great Software

In a Culture of Studentship, Agility, & Purpose That Inspires Us To Invent & Innovate Continually
Managing & Evolving A Large Software Workforce
A SAP Case Study

Dr. VISHAL SIKKA
MEMBER OF THE EXECUTIVE BOARD | SAP AG

November 1, 2013