

290T: The Business of Software

Homework 1:

- **Question 1a: Slides 9 and 13 give a basic "cyclical evolutionary model" of a software market. Give an example of a SW industry sector, market, or even product, that is making a transition from one stage of the cycle to another**
 - **For example, a market in which successful companies are moving from providing bundled HW/SW to independently packaged (enterprise or consumer) SW**
- **Question 1b: What is causing this transition to occur?**

Why are these important questions? Because there is often money to be made by anticipating a transition from one stage of the software cycle to another. The transition may be initiated by a change in the requirements of the market or technological changes in either software or hardware.

Many companies that are successful in one stage of the cycle fail to move onto latter stages. Clayton Christiansen's book *The Innovator's Dilemma* gets at some of the reasons behind this. Basically, a company's current success, and their customers, will both conspire to keep them at their current stage.

Good answers:

Q1a) Satrajit Chatterjee, Will Plishker:

Bundled HW/SW (Tivo, ReplayTV) => showShifter.com, Snapstream.com, Intervideo.com

Q1b) Cheaper HW, storage

Myra Liu:

1a. LeapFrog Enterprises, Inc. is a leading developer of technology-based educational products and content. Their products have gone through the "cyclical evolutionary model".

+ HW/SW bundled: 1995-1998 Each product served one purpose and was not customizable (i.e. Phonics Desk, Phonics Bus, Phonics Pond) Products were programmed with one set of instructions bundled with one set of content.

+ Broader Market SW: 1999-Present LeapPad Learning System, Turbo Twist - one system for all stages of learning. Software or content comes unbundled with hardware. Customers buy one hardware and expand with different books, cartridges, content to insert into system.

+ Internet: Many products now can utilize the Mind Station Connector to download new activities for Internet enabled toys onto a reusable content

cartridge. Customers need to subscribe to Internet service for downloads and purchase the Connector in addition to toys.

Myra Liu:

1b. Possible causes for transition to occur:

- + Customized learning experience
- + More tech-savvy customers
- + New content "refreshes" product so children won't get bored
- + Reusing hardware
- + Product about content and not hardware
- + Customers committed to platform or hardware and encouraged to purchase more related products
- + Familiar interface
- + Internet and subscription easier to access and require customer commitment

Jimmy Zhigang Su

1a Google is making a transition from service solution to turnkey HW/SW with the Google Search Appliance product. Google's search engine on the web provides a service solution to help end users to find web content. The Google Search Appliance product bundles Google's search software with hardware to offer enterprise search capabilities.

1b Google's search engine on the web does not generate revenue directly, since the service is free. Selling Google Search Appliance offers another way to generate revenue. The strategy of bundling software with hardware agrees with consumers' buying behavior. Consumers are more likely to buy a HW/SW product than a purely software product. By selling this product, Google leverages its brand name in the search market to the enterprise information retrieval market.

Phil Li

Tax preparation software (eg TurboTax) is moving from being broader market shrinkwrap SW to become a web-based service.

This shift captures users who * have simple returns, * low willingness to pay

* value the convenience of filling out web forms (no installation!)

This will probably not be a complete shift, since most traditional users for would still prefer to buy a copy of TurboTax and run it locally for usability or (perceived or real) security reasons.

[Or we can trace it back further – from a software-aided service, to enterprise software and then onto shrinkwrap SW.]

Brian Park – Business of Software Homework # 1

1a. An example of a product that is moving in the evolutionary cycle is the Salesforce.com sales force automation software.

- The evolution is from Enterprise Software to a combination of Internet VAS and Services.
- Salesforce.com replaces traditional enterprise software by moving everything to a web-based hosted environment which requires no IT involvement.

1b. This transition is occurring because the Internet and the web have created new opportunities to make information more portable, accessible, and flexible without the need for expensive installed hardware. The cost to acquire and service a customer has gone down significantly, which allows salesforce.com to charge significantly less than enterprise software alternatives.

Kurt Keutzer

1a. The electronic design automation industry is moving back into a service-oriented business.

1b. Increasing complexity due to Moore's Law, together with a wide variety of "deep sub-micron" processing effects, are making it more and more difficult for an integrated circuit design team to afford and use the battery of tools necessary to complete a complex integrated circuit design.

Niraj Shah

1a.

- Audio/video editing moving from services → bundled hw/sw → "enterprise" sw → consumer sw
- Desktop publishing moving from services → "enterprise" sw → consumer sw

1b. Both of the above examples are due to Moore's law making it possible to perform these tasks on cheaper hardware.

Question 2: Is the software industry consolidating, or expanding? Choose a company or sector and give evidence to support your position. Why is this an important question? You don't want to enter (in any significant way) a consolidating market. You want to identify opportunities in expanding markets.

Shane Ahern

Question 2:

Short for *enterprise resource planning*, a business management system that integrates all facets of the business, including planning, manufacturing, sales, and marketing. As the ERP methodology has become more popular, software applications have emerged to help business managers implement ERP in business activities such as inventory control, order tracking, customer service, finance and human resources.

* ERP sector is consolidating around three major players, Oracle, Microsoft, and SAP who provide complete suite of products that in the past were dominated by niche players.

* At the high-end of the market (Fortune 500 and smaller) Oracle and SAP have marginalized formerly dominant niche players such as Siebel in CRM, i2 in supply chain management, and Peoplesoft in human resources management.

* At the low-end of the market (small to mid-sized companies and larger), Microsoft is consolidating the sector through its acquisition of Great Plains Software and Navision.

* Customer demand is moving away from "best of breed", integrating the best products from each functional area, to a single-vendor integrated solution that reduces cost and complexity. This favors consolidation.

Satrajit Chatterjee,

Looks like it is consolidating;

* Large players have escalated their presence via acquisitions

eg: Sun bought LSC and HighGround

IBM bought Trellisoft

EMC bought Astrum, announced to buy Legato Systems

CA bought Netreon

Question 2: Arkadeb:

Expanding ... Embedded software and real-time programming languages ... can be called it being bundled in some sense but there are independent software to write embedded systems

WinCE (platforms) to Esterel (programming languages) ...
Lustre, Signal, Giotto, NesC, Real-time Euclid, Flex, Erlang

(research)

Real time and embedded operating systems:
VxWorks, QNX, WinCE

www.QNX.com

www.windriver.com

<http://www.advantech.com/embeddedcomputing/google/wince/>

<http://www.m-sys.com/Content/Markets/embedded.asp>

some succes news

<http://www.ghs.com/news/230121r.html>

Embedded systems — a new high growth area

<http://www.hinduonnet.com/thehindu/biz/2002/08/19/stories/2002081900080200.htm>

Leading Embedded OSs, Bundled Products, and Related Services, Segmented by

Leading Vendors for 2002

(In Rank Order)

1. Microsoft
2. Wind River Systems
3. Symbian
4. Palm
5. QNX
6. Enea Data
7. Green Hills Software
8. LynuxWorks
9. MontaVista Software
10. Accelerated Technology (Mentor Graphics)

source:

<http://www.vdc-corp.com/embedded/press/03/pr03-23.html>

some facts:

1. The world market for embedded operating systems, bundled products, and related services reached over \$600 million in 2002. VDC provides forecasts for this world market through 2007.
2. VDC expects the unbundled software development tools market is set for

moderate growth through 2007.

3. VDC estimates that the world market for embedded design automation tools dropped in 2002, reaching over \$350 million.

4. VDC estimates that the market for test automation tools for embedded applications reached over \$65 million in 2002. VDC provides forecasts for this world market through 2007.

5. The world market for database management solutions for embedded systems and related services reached over \$40 million in 2002. VDC provides forecasts for this world market through 2007.

6. An extensive end-user survey was conducted that focuses on demographic data; current embedded project; and developer experience, trends, and preferences.

source: <http://www.vdc-corp.com/embedded/reports/03/br03-10.html>

Kurt Keutzer

2. The electronic design automation industry is consolidating. The acquisition of Avant! by Synopsys is the most significant example. There is little talk among venture capitalists of funding "The Next Great EDA Company".

Other segments, such as software tools for embedded multiprocessor devices, as well as software for consumer electronic devices, are significantly expanding.

Niraj Shah

2. 'Mature' sectors are obviously consolidating, but new potential platforms are providing ripe opportunities for many up and coming software companies.

Question 3a: Interview question at a VC firm: Generally speaking, do you believe that the software industry offers better, or worse opportunities than other technology sectors?

Gabriel Eirea

3a,b) Difficult to answer. I would say that the biotech industry may provide better opportunities in the long run. This doesn't mean that there are no exciting opportunities in the software industry. In particular, I think that the complexity of information flow at any level (enterprise, government, even personal life) creates the need for applications that are able to organize, classify, filter, summarize, and retrieve relevant data from the ocean of information we live in.

Mayjane Co:

Better opportunities especially because other sectors like hardware are more advanced than software leaving software much room to grow and take advantage.

- Many other sectors such as communications equipment, hardware, storage devices, peripherals, etc., will always need software to complement them.
- For instance, dial-up continues to dominate the market for connectivity (over DSL and cable modem) because no "killer app" (software) exists for high speed networking yet.
- Without software to provide functionality for all other technology, all other technologies cease to be useful.

Florian Fuchs: Q3a:

Software industry generally offers better opportunities than other technology sectors such as the biotech industry:

- low entry cost: if you have a good idea, in certain cases you can basically develop the application yourself, using free tools
- no capacity constraints: once developed, you can basically sell the software an unlimited number of times
- easy distribution: on a light CD or even only via download or email
- great additional opportunities for making money: offering professional services, customization, training, bundling with hardware, ...
- flexibility to quickly react to changes on the market
- opportunities for diversification: from internet service over desktop application up to mobile devices
- ...

Q3a) Ram Rajgopalan

*The software industry offers better opportunities than other sectors, as long as certain factors are accounted for:

- Not capital intensive: it is an advantage if you are starting on, but might become a disadvantage once you have started as competitors have low barriers of entry;
- Lower cost for failed products/ideas: it is easier to see if something works, it is harder to do something that makes everyone happy (aka. expectations for very customized solutions are higher);
- Software has become a necessity, but not yet a commodity in many areas;
- Without more and better software, the gains from future technology are limited (MEMS – self assembly, bio – gene identification, Wireless – ultra wideband/distributed control, etc. all need software solutions)
- Intellectual property costs are lower than other industries: it is possible to avoid patented ideas as solutions for software-type problems are “flexible” (i.e. many ways of doing similar things);
- Continuously changing: knowledge renewal rate is high, so an old bag of tricks is not very useful. It is more useful to be willing to learn and adapt the technology to serve ideas, and not vice-versa (i.e. knowing how to build efficient assembly programs for a Z-80 has very limited use, but using Z-80 in traffic control is still good today).

*So, is software paradise? No, it is easy for competitors, it is hard to sell an idea, and it is even harder to charge for it and protect yourself from intellectual and commercial piracy. But still, intellectual property based software is always very valuable. If you don't mind the risk, and enjoy learning, then it is fun.

3a Kurt Keutzer:

As per above, software companies are the best and safest investment for venture capital.

Niraj Shah

3a. From a venture perspective, the other great thing about the software industry is that if a software company fails, it fails quickly and cheaply (unlike, for example, a semiconductor company, which may need 3-4 years and \$50mm only to realize they missed the market window).

Question 3b: If better, give an example of an exciting new opportunity and why you like it. If worse, what technology sector do you prefer and why?

Mayjane:

Wireless space offers tremendous growth opportunities for software.

- Wireless applications can reach far more people than land-line applications. Can help narrow the digital divide by solving the "last mile" problem.
- Having PC applications available on a hand-held device that can get around data transmission and display constraints could eliminate the need for a PC and enable mobility.

Leo Deluna

3b) Security software for wireless networks, particularly personal area networks. The increasing popularity of 802.11 and Bluetooth increases the usage model and breadth of wireless applications. Consequently, security risks will be evident thus presenting an opportunity for a company **to do for wireless what Checkpoint did for VPNs.**

Q3b: Florian Fuchs

Example: Symbian OS as a standard platform on mobile devices

- Sun tried something similar with J2ME before, but not interesting for application developers because too limited (due to too high compatibility)
- Symbian allows to exploit new (partially device specific) features such as internet connections and cameras on mobile devices
- enough potential for third parties to come up with innovative application ideas
- even a small team with a good idea might be able to develop a successful application (and be bought afterwards for a lot of money by one of the big players...)

Q3b) Kurt Keutzer

Software development environment for embedded multiprocessor devices.

Application software for consumer-oriented embedded systems.

Question 4: On slide 14, three additional factors are named which shape the software industry: end-customer market dynamics, technological dynamics, and financial market dynamics. Give an example of how one such external factor will affect the software industry in the near future.

- **Choose just one external factor, here are some hints:**
 - **4a: End customer: Increasing pace of life is causing consumers to want more and more continuous access to information and interfaces they need to run their busy lives ... what's next and what does that have to do with software?**

Rachel Rubin:

-The end-consumer is collecting more and more data. For example, data can be portable such as in a PDA or even stored in a digital camera, which could cause data to be destroyed more easily.

- Sensor technology collects data about people that they want sorted and kept secure from outside sources.

- Software needs to manage large amounts of data. Technologies such as SETI@HOME manage large amounts of data (albeit a different kind). This needs to cross into managing personal data.

- Data needs to be integrated from the different sources so that an end-user can access it cross-platform. Software research projects, such as Berkeley's OceanStore are looking at this problem. None of these problems (integration, management, security) have been successfully dealt with yet.

- **4b: Technological: For example in the past, the personal computer had a dramatic effect on the software industry, providing for the first time a consumer software market. What technological devices are emerging and what software markets will they create or expand?**

Will Plishker:

4b) Widespread free Wireless Access (e.g. free WiFi access)

- ubiquitous computing enabler => embedded system demand rises
- thus, more embedded software, less desktop apps
- desktop no longer central conduit of information
- net appliances will go on the rise
- cellular service and 3G functionality demand will drop
- tracking or locating software will be in demand
- e.g. finding malicious users within a free network

For instance, the current trend towards integrated phone/PDA devices will create new opportunities for development of software applications. The increasing popularity of these "smart phones," which incorporate the functionality of a Palm OS or Pocket PC device, presents the following needs which software developers are currently trying to address:

- The need to use the Palm device and phone together, in as integrated a manner as possible. At the very least, one should be able to use the Palm without an incoming phone call crashing the OS. Ideally, one should also be able to do the following:
 - Dial the phone using numbers stored in a Palm address book
 - Change phone “options” (speed dial, ring tone) using the Palm OS
 - The need to dial the phone as easily as possible using a “virtual” on-screen keypad.
 - The need to browse Web pages with as much functionality as can be integrated into a smaller-than-normal Palm screen.
- **4c: Financial markets: How’s the current attitude on Wall Street or VC Street (Sand Hill Rd), going to affect the software industry?**

Egan Lau:

Given the slowdown in the software industry, Wall Street feels many major software markets mature (e.g. CRM), and there are more software companies than current market can support. The stock prices of many public software companies have dropped significantly over the last few years.

This would promote the mergers and acquisitions of the software industry because many software companies must join force to stay in business, and their valuations are much lower than before.