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11/3/17
TIM 105

Midterm

1. Integrated Technology, Product/Market, and Competitive Strategy for Microsoft. Help them develop an integrated business, technology, product/market, and competitive strategy for the next 3 years.

1.1) Before you start on your project Microsoft would like a written statement of your framework, appropriately customized for their organization.

1.2) Then apply my framework to their (specific) existing and proposed technologies and products, performing the necessary fact-based analyses, drawing conclusions, and making appropriate recommendations.

1.3) Microsoft would like you to provide them with a clearly structured report that must include 3-5 specific (and properly justified) recommendations for what their business, technology, and product/market strategic focus should be for the next year. Your specific and properly justified recommendations would essentially help the company to decide which products and technologies it should develop, which markets it should target, etc.

1.4) Now identify 3-5 strategic initiatives actually taken by Microsoft since 1995 and compare these to your recommendations in part 3. Hopefully you came up with better initiatives than those that Microsoft followed, and you can explain why your initiatives are better.

Step 1: Define the real problem.

SP1: State the framework I will use to perform my analysis of Microsoft's strategies.

SP2: Using the framework I created in SP1, perform an analysis for Microsoft.

SP3: Compare the initiatives I feel Microsoft should pursue with initiative actually taken by Microsoft since 1995.

Step 2: Plan how to solve the problem.

What assumptions do I need to make: I am a contractor working to help Microsoft determine their high level strategy for the next 3 years. My work is for the senior management at the company. All other information needed can be found in the case study and other readings provided for the class.

Where can the information be found: The Lecture Notes on Competitive Strategy. The Microsoft Case Study. Lecture Notes on the class websites. The PD&D book.

SP1: State the framework I will use to perform my analysis of Microsoft's strategies.

-- Read the Lecture Notes on Competitive Strategy.

-- Assemble the framework.

SP2: Using the framework I created in SP1, perform an analysis for Microsoft.

-- Read the Microsoft case study

-- Perform the analysis based off of the case study.

-- select 3-5 initiatives Microsoft should pursue going forward

SP3: Compare the initiatives I feel Microsoft should pursue with initiative actually taken by Microsoft since 1995.

-- Find three initiatives microsoft undertook around 1995.

-- Compare those with my initiatives.

Step 3: Execute the plan.

SP1: State the framework I will use to perform my analysis of Microsoft's strategies.

Step 1: Company Analysis

-- what was the company's ROI, %market share, revenue, and growth aspirations and how have these changed over time

-- determine the technology strategy, product strategy, and development goals for the company

-- how have these strategies and goals changed over time (i.e. from 1975-1995)

-- create table showing all these changes

Step 2: Industry Analysis

-- Create a Porter's five (six) force model of the industry the company is in

-- Perform an analysis of the forces in the industry

-- Show the key relationships between players in the industry

-- Determine the overall attractiveness of the industry

-- Determine the company's position (competitive strategy) within the industry

Step 3: Assessment of company's strategy within relevant markets and industries.

-- Assess how the company's competitive strategy changed over time, and what the key forces driving those forces are.

-- Decide what the company's future strategies should be based on their strengths and various market forces.

-- Based on those strategies, select 3-5 product initiatives they should undertake in the next few years.

SP2: Using the framework I created in SP1, perform an analysis for Microsoft.

Step 1: Company Analysis

Year	OS	Applications	Other Products	Marketing Strategies
1975	MITS Altair			
1980	MS-DOS			Contracted by IBM to design OS for new PC

1984	Started working jointly with IBM on OS/2	Started writing apps for Macintosh	Started working on a GUI, Windows	MS-DOS has 85% of market share, $100M in revenue
1986				Went public, stock rose from $25.75 to $84.75
1990	Windows compatible with DOS	- Windows made it much easier to switch to a different app because they often shared a UI - Only app vendor to invest heavily in Windows apps	Windows 3 became preferred interface for IBM-compatible PC's	- Windows was compatible with DOS, and sold together so MS got twice the rev from each OS - Initially sold as an upgrade to DOS (margin of $8) - Bundled with OEMs (margin of $24)
1993	- Windows NT was a high end OS designed to compensate for poor technical abilities of MS's OS - NT was compatible with PC's not running Intel microprocessors	- MS select, a platform to make it easier for large customers to purchase and distribute MS software	- Hesitant to enter the Business Computing market because it would require building support for the services provided, neither of which MS was good at. - MS flight simulator	- MS offered "competitive upgrades" to sell similar versions of existing apps for a cheaper price - caused app prices to drop
1994				- 75% of customers had upgraded when major releases of Windows came out - Lotus Notes

				had sold over 1M copies - 54M CD's sold
1995	Windows 95 released as replacement for DOS and Windows 3.1	- Excel outselling Lotus 1-2-3 by a 2-1 margin -- Selling Microsoft Office, an integrated set of apps that let users share data across Microsoft Programs	- Microsoft Network (MSN) was released with Windows 95 - would give users an array of online services - unique to Windows	- 90M copies of Windows sold - 50% of systems rev - new OS dev would cost upwards of $500M - spent $60M supporting ISV's that created apps for MS OS - ISV's spending 75% of budget on R&D expenditures - Internet growth and web browsers would make it possible for ISV's to write apps for the internet only, not Windows
1996	Cairo expected to be released			- Cairo would make it easy for ISV's to write apps

Technology Notes:

-- Needed to make shift from selling "packaged goods" to services

-- Need to provide internet app develop platform going forward

Product/Market Notes:

-- needed to get more revenue from repeat customers as the internet would likely make it more difficult to get new customers hooked on MS's platforms going forward

-- sold OS's applications, keyboards, consumer products, publishing, and PC accessories

Development Goals:

-- Gates wanted to improve code sharing across different programs to reduce wasted code and cut long term costs.

Step 2: Industry Analysis.

Suppliers:

-- ISV's have little power developing apps for Windows because MS had such great market share and most apps had to be Windows compatible

-- over 100,000 ISV's

-- ISV's spending 75% of budget developing apps for Windows

-- purchased CD titles

Competitors:

-- 3 major competitors in OS market: Apple with 8.5% of the market, IBM with 5%, and UNIX with 3-5%

-- high cost of entry into OS market due to cost developing new OS

-- faced many different competitors in the home computing market

-- low cost of entry in the home computing market

-- few large competitors in application market(Lotus, WordPerfect) for Windows

-- medium cost to enter

Buyers:

-- contracted by IBM in 1980 to write OS

-- sold OS's to customers and OEM's

-- sold home products to individual customers

-- sold apps to large businesses and individual customers

-- sold OS upgrades to big businesses and individual customers

Substitutes:

-- copies of DOS (i.e)

-- apps for web browsers, not Windows

New Entrants:

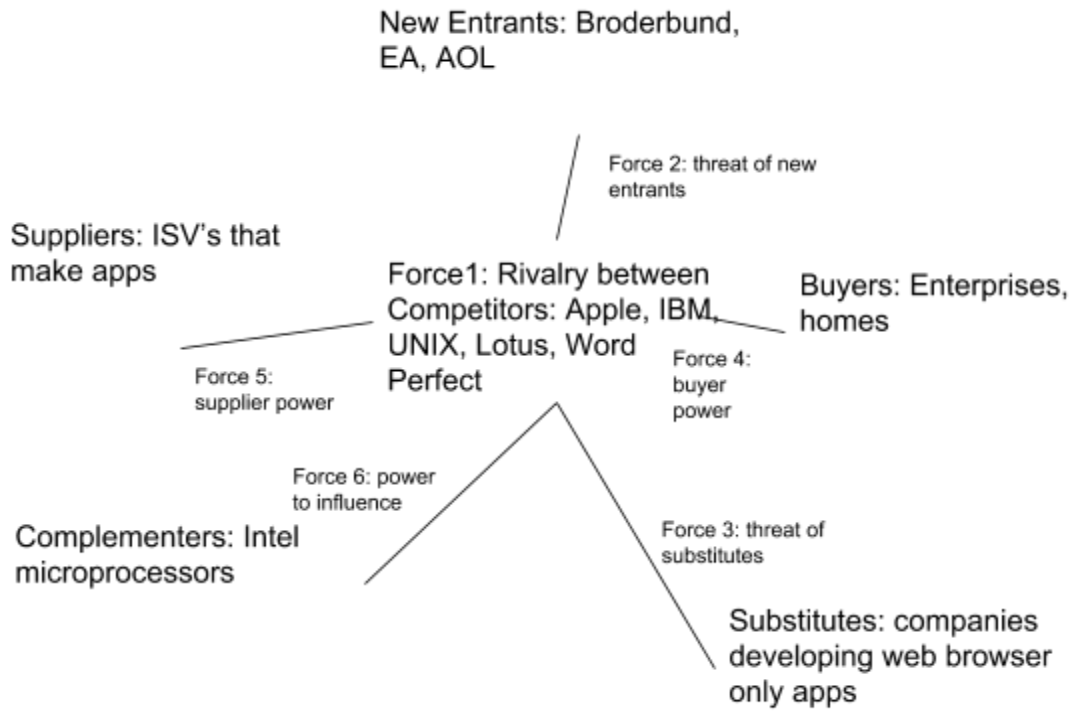
-- companies entering the app market

-- companies entering the home computing market(Broderbund, EA)

Complementers:

-- Intel microprocessor

-- IBM worked on OS/2 with Microsoft for a while



Forces Analysis and Relationships between Players

Force	Relationship	Strength
1	Microsoft competes with Apple, IBM, Unix, and a few other smaller competitors in the OS market. They compete with Lotus, WordPerfect, and Borland in the applications market. Microsoft used their power within the OS/GUI market (i.e the power and market share of Windows) to force other competitors to write apps for Windows. Microsoft was then able to undercut these competitors on price (competitive upgrade) while providing similar products. Microsoft faced strong competition from Borderbund and EA in the home computing market, and strong competition from AOL in the online services market. In general, Microsoft's competitive strategy was to provide lower cost products in many different markets because they were not as technically proficient, but they did offer some unique products like Windows.	Medium high. Low pressure in OS market, but high pressure in the applications and home computing markets.
2	It is difficult for new entrants to enter the OS market because of the cost to produce an OS, and the difficulty convincing buyers to switch to a new OS. There is less cost to enter the applications market as there is less cost, but the number of firms producing apps for Windows and the need for apps to be Windows	Medium. Low threat in the OS market, medium-low threat in

	compatible is great enough that there isn't much profit to be made. The online services and home computing industries were very easy to enter and offered good profit potential. Microsoft worked to undercut new entrants into the applications market on price, but didn't do much to deal with new entrants into the home computing and online services markets because they didn't have a large enough share to do anything.	applications market, and very high force in the home computing and online services markets.
3	Microsoft has essentially locked application developers into developing apps that are Windows compatible. However, with the rise of the internet and web browsers app developers had the ability to create apps that are web browser specific and don't have to be Windows compatible, which could undercut Microsoft in the apps market. Microsoft has acknowledged that this could present a problem going forward, and they have developed some online services, but there reluctance to move into selling software as a service over the internet could hurt them going forward.	High.
4	Microsoft sells to many different types of buyers in all of the markets they're in, e.g. large enterprises, small businesses, individuals. Sometimes Microsoft would offer products on sale to attract customers, but largely they didn't do anything special to deal with customers bargaining power because they had such large market share due to Windows.	Low
5	Microsoft had over 100,000 ISV's developing apps for Windows, and due to Windows market share suppliers had to produce WIndows compatible apps. Microsoft had engineers working with ISV's to help them produce better apps for Windows, but they didn't need to do anything special because these suppliers had little bargaining power. Microsoft had content suppliers for the CD's they made and faced much strong bargaining power from these suppliers because they had stronger competition for the resources. Still, they didn't do anything special to deal with that increased supplier bargaining power.	Medium-low.
6	Microsoft's complementors were IBM, who they created an OS for in 1980, and worked on OS/2 with later, and Intel. Microsoft created OS's that were compatible with only Intel microprocessors for the most part, and due to the success of the MS products, were able to force many other companies to create Intel compatible OS's.	Low (supportive force).

Microsoft's competitive strategy was to be a low-cost provider. They produced relatively low cost products that were technically proficient enough to be useful to large numbers of

customers. This can be seen by their mission statement, “to make software that will permit there to be a computer on every desk and in every home”. Given how expensive computers were when Microsoft was founded it makes sense that they would employ a low-cost strategy to accomplish their goal.

Step 3: Assessment of company’s strategy within relevant markets and industries.

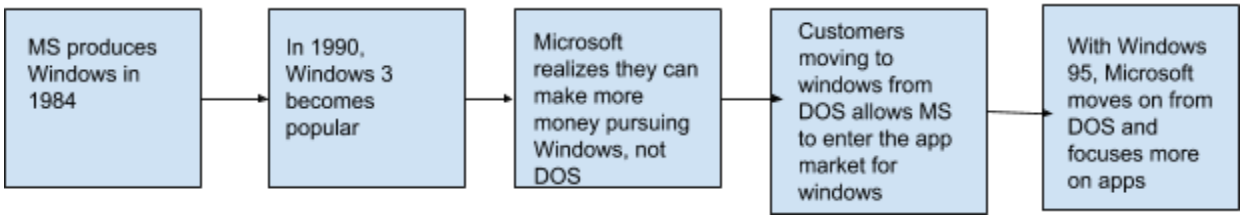
Microsoft’s history can be broken down into three major phases:

1. The startup phase (1975-1980)
   Microsoft produced some condensed versions of programming languages for early PC’s. These products were simple and cheap, but the company didn’t have an easily identified competitive strategy at this time because the industry was still underdeveloped.
2. The DOS phase (1980-1990)
   After being contacted by IBM, Microsoft purchased DOS from a local programmer and modified it to work with the Intel microprocessor. The majority of their business was based around DOS, but they also made apps for Macintosh.
3. The Windows phase (1990-1995)
   Windows 3 was released in 1990 as a GUI interface for DOS, and it took the market by storm because it was compatible with DOS. The shift to Windows allowed Microsoft to gain large amounts of market share in the DOS applications market. When Microsoft realized the number of PC’s in homes was growing, they began producing home computing accesories like CD’s. This marked a change from being an OS company to being more of a GUI, applications, and home accessories company. Microsoft should continue to pursue initiatives in those markets and move away from producing traditional OS’s.

Identify key driving forces.

-- phase 1 -> phase 2

-- phase 2 -> phase 3



Recommendations for Microsoft’s business, technology, and product/market strategy for the next year.

1. Online document sharing as a web browser application.

One product Microsoft could look to pursue would be online document sharing, similar to what Lotus Notes allowed, but produced specifically for web browsers and for all Microsoft applications. Lotus Notes allowed users to work on documents together, and was extremely popular, and thus the type of product Microsoft should pursue. Given the world wide web's growing user base and the popularity of web browsers around the mid 90's it makes sense for Microsoft to develop apps for them. A product allowing users to access Microsoft products like Word and Excel through web browsers would give Microsoft access to more consumers and allow them to compete with Lotus Notes. This would also allow Microsoft to avoid the issue of application developers moving away from producing Windows compatible apps to producing web browser specific apps as Microsoft would be taking advantage of the platform as well. This would also mark somewhat of a transition to selling software as a service, which would help Microsoft generate more revenue from repeat consumers, an issue Bill Gates acknowledged could hurt Microsoft in the future.

2. Portable audio players.

Microsoft had developed over 70 CD's marketed towards the home computing market. CD's are big and clunky, and developing a better way to store audio would allow Microsoft to develop portable audio players, as instead of carrying around large "boom-boxes" people would be able to play audio from a handheld device. Portable audio players would be useful to people who want to listen to music or audiobooks while they work out, or are walking around, or just doing things around the house. The market for home computing accessories was growing quickly, and there is no reason to believe that portable handheld music players couldn't do well in the market.

3. Create more in-house content for CD's.

The number of CD's sold had increased to 54 million in 1994, and the number of PC's and other accessories were increasing yearly in the mid 90s. Microsoft had already put out over 70 CD's by 1995, but they were purchasing most of the content from other creators and faced stiff competition for said content. Developing content for CD's in house would allow Microsoft to gain a larger foothold in the home computing market, as they would have more content than most of their competitors in the market. CD's containing recipes, basic accounting software, and other home related functions would be useful for the average person.

SP3: Compare the initiatives I feel Microsoft should pursue with initiative actually taken by Microsoft since 1995.

-- Find three initiatives microsoft undertook around 1995.

Year	Initiatives
1996	Microsoft and NBC create MSNBC news, a 24-hour news, talk, and information network. MSN, The Microsoft Network, is reorganized to offer content on the World Wide Web.

1996	Microsoft SQL Server client-server database management system version 6.5 has released to manufacturing. Key new features include built-in support for Internet applications, improved support for distributed management tools, and a new locking architecture called Dynamic Locking.
1997	Steve Jobs and Bill Gates lay out a broad product and technology development agreement between Apple and Microsoft. The agreement includes the production of future versions of Microsoft Office, Internet Explorer, and other Microsoft tools for the Macintosh; the bundling of Internet Explorer with the Mac OS; a broad patent cross-licensing agreement for leading-edge Mac technologies; and a $150 million investment in Apple by Microsoft.

I found these initiatives at http://thocp.net/companies/microsoft/microsoft_company_part2.htm.

-- Compare those with my initiatives.

My initiatives were focused on the home computing market and the internet while Microsoft focused almost exclusively on developing tools for the internet.

Step 4: Check Your Work.

I believe my assumptions are reasonable and my work is correct.

Step 5: Learn and Generalize.

Microsoft initially started selling basic programs, and morphed into an OS company and later a GUI and applications company. This development can be down into three phases: the startup phase from 1975 to 1980, the DOS phase from 80-90, and the Windows phase from 90-95. Given the rise in Internet usage and home computing Microsoft should focus on providing products that take advantage of those two markets in the next year. They should also look to sell software as a service to generate more revenue from repeat customers.

2. Firm is deciding which projects to develop.

2.1) Pose the associated integer-programming optimization problem to select the projects whose combination will maximize cumulative expected monetary value (expected profit) without exceeding the total capital budget constraint of $93M.

2.2) Solve the appropriate integer-programming problem using “table-lookup” in order to determine which projects should be selected in order to maximize cumulative expected profit without exceeding the total capital budget constraint? What is the return on investment (ROI) of each project.

2.3) How much cash do you have left in your capital budget after you have made your project selections? What would you recommend that management do with this cash? Justify your answer.

Step 1: Define the real problem.

SP1: Pose the integer-programming optimization problem and set up the values.

SP2: Use the “table-lookup” and determine which projects should be selected to maximize cumulative profit without exceeding the total capital budget constraint.

SP3: How much cash is left over?

Step 2: Plan how to solve the problem.

Assumptions: I am a project manager at a software giant doing this analysis to determine what projects to execute going forward. I have to assume that the probabilities of success of the technical feasibility and product development are correct, and that the expected profit of a successful product development is correct.

Where to get information: The midterm has the probabilities and expected profit of each project. The lecture notes describe how to do the problem.

SP1: Integer-Programming problem.

Step 1: Identify the set of potential projects.

Step 2: For each project compute:

(1) estimated cost

(2) using the DA process compute the EMV, Vi, for the project Pi

Step 3: Let Ai be an integer associated with project Pi and set Ai to:

-- 0 if the project is rejected

-- 1 if the project is accepted

Step 4: The cumulative or total cost, Ct, of performing the projects is given by

Ct = the sum of Ai*Ci for each project

Step 5: Calculate the cumulative or total EMV, Vt = A1V1 + A2V2 + … + AnVn

Step 6: Introduce the capital budget constraint Cb to be the available capital (or budget) to perform projects, then Ct = Cb

Step 7: Pose the optimization problem (aka the capital budget problem; integer programing problem)

SP2: Use the “table-lookup” method to determine which projects to pursue.

Step 1: Create all possible combinations of projects.

Step 2: Lay out all possible project combinations and the integer associated with them.

Step 3: Estimate the cost of each project.

Step 4: Compute the EMV for each project.

Step 5: Create the table look-up.

Step 6: In the table, locate the column that has the highest cumulative EMV for which the cumulative cost doesn’t exceed the total budget constraint.

SP3: How much cash is left over.

Step 1: What is the total cost of the projects to be pursued.

Step 2: Subtract that value from the total budget constraint.

Step 3: Execute the plan.

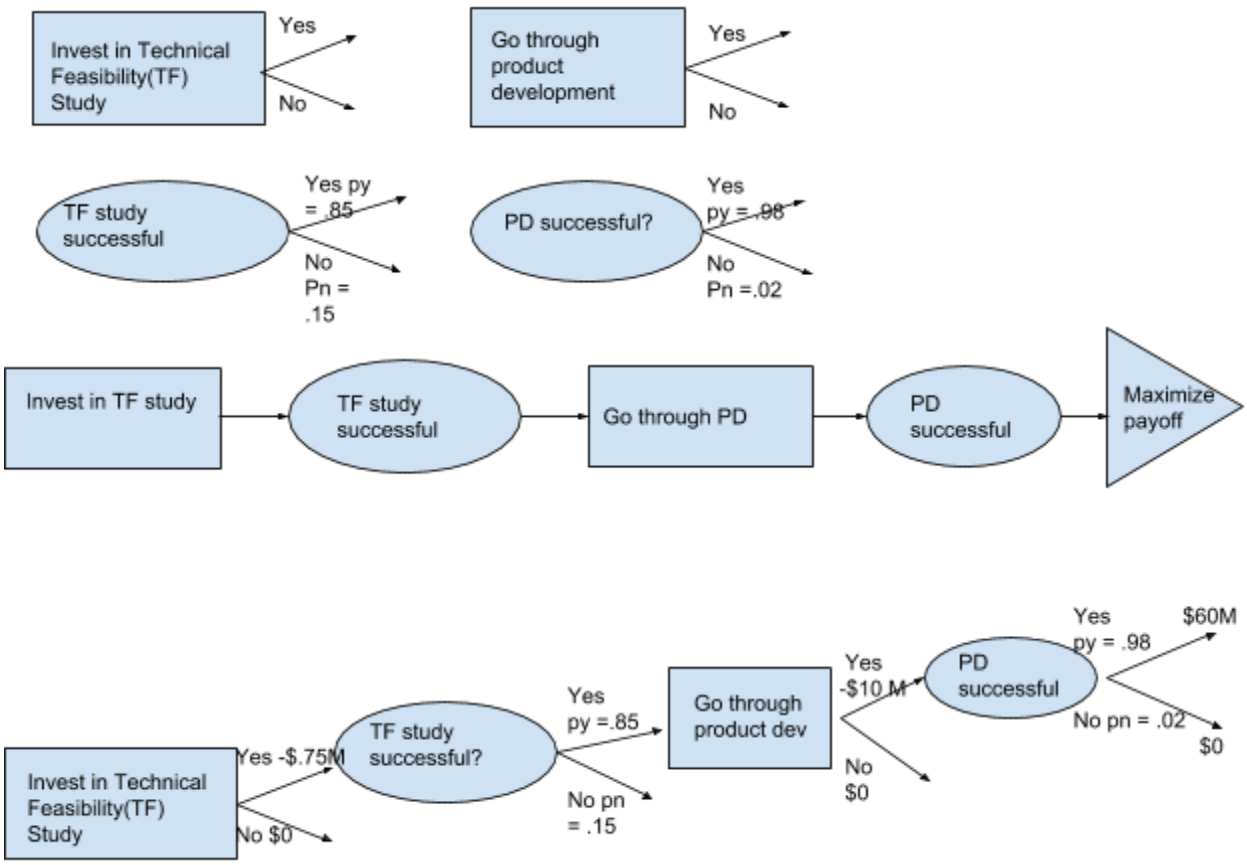
SP1: Integer-Programming problem.

Step 1: The set of potential project.

-- P1: E1 project, P2: E2 project, P3: P1 project, P4: P2 project, P5: R&D project

Step 2: Compute the cost and EMV for each project.

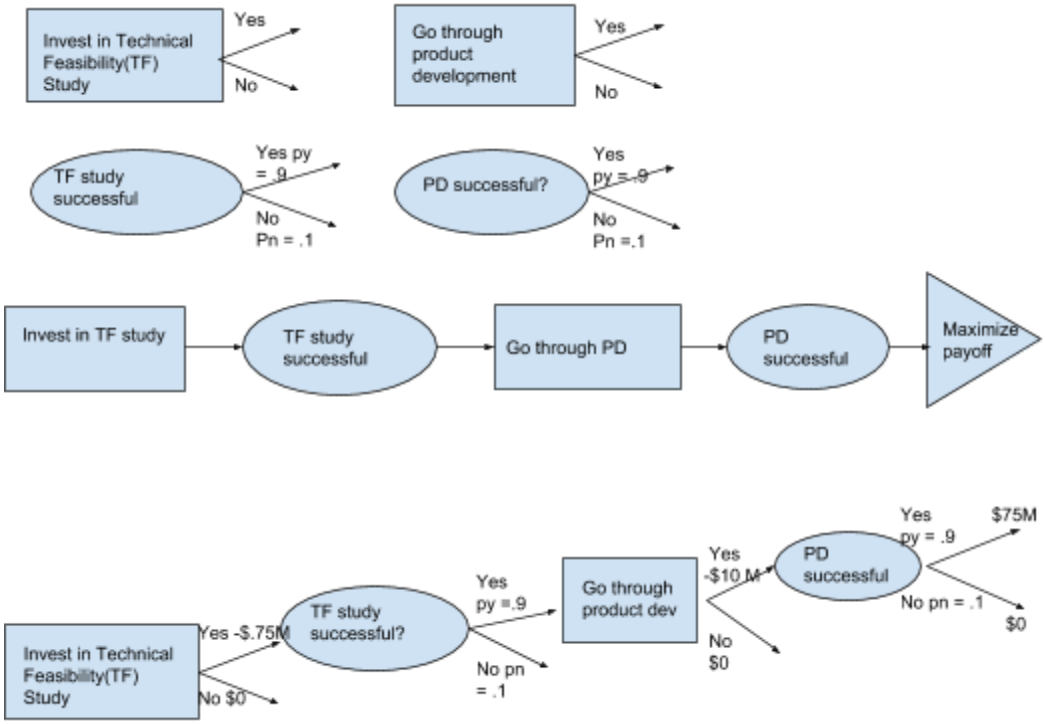
-- P1: E1 project



EMV = TF prob of success * PD prob of success * Expected Profit = .85(.98*60M) = 49.98M

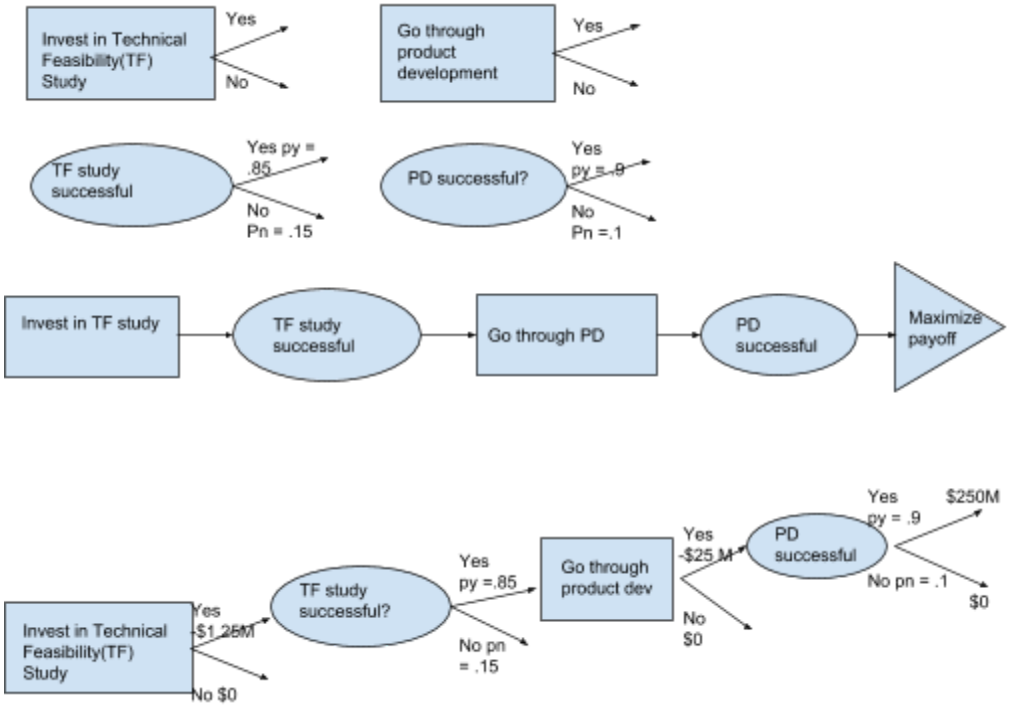
Total Cost = TF study cost + PD cost = .75M + 10M = 10.75M

-- P2: E2 project



EMV = TF prob of success * PD prob of success * Expected Profit = 0.9(0.9*75M) = 60.75M
Total Cost = TF study cost + PD cost = 0.75M + 10M = 10.75M

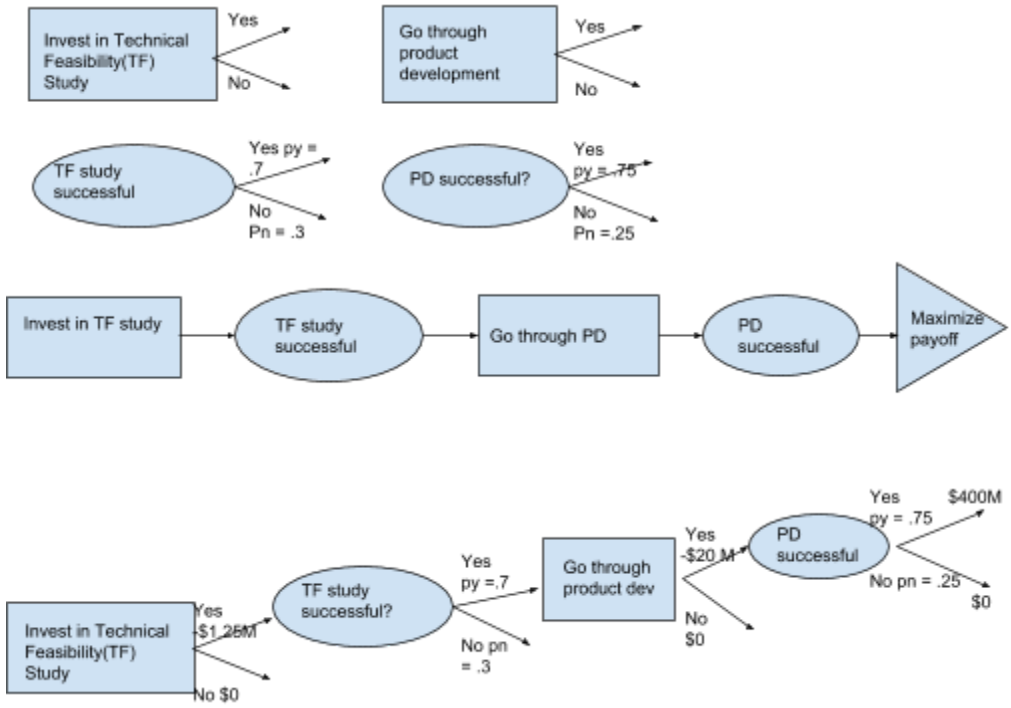
-- P3: P1 project



EMV = TF prob of success * PD prob of success * Expected Profit = 0.85(0.9*250M) = 191.25M

Total Cost = TF study cost + PD cost = 1.25M + 25M = 26.25M

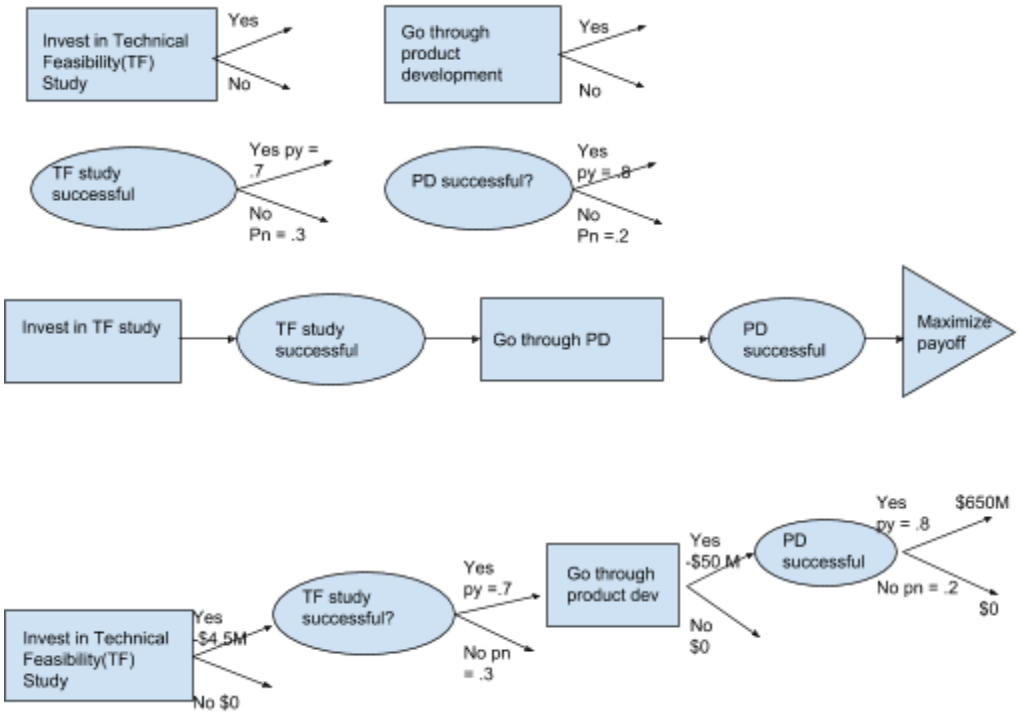
-- P4: E2 project



EMV = TF prob of success * PD prob of success * Expected Profit = 0.7(0.75*400M) = 210M

Total Cost = TF study cost + PD cost = 1.25M + 20M = 21.25M

-- P5: R&D project



EMV = TF prob of success * PD prob of success * Expected Profit = 0.7(0.8*650M) = 364M
Total Cost = TF study cost + PD cost = 4.5M + 50M = 54.5M

Step 3: Introduce the project selection decision variable.

For each Pi, define Ai that can be with 1 for select Pi or 0 for reject Pi

Step 4: Calculate the cumulative cost if we perform all the projects.

Assume Pi = 1 for all projects so:

Ct = 10.75M + 10.75M + 26.25M + 21.25M + 54.5M = 123.5M

Step 5: Calculate the cumulative EMV if we perform all the projects.

Assume Pi = 1 for all projects so:

Vt = 49.98M + 60.75M + 191.25M + 210M + 364M = 875.98M

Step 6: Introduce the capital budget constraint Cb to be the available capital (or budget) to perform projects.

The capital budget for the next year is $93M so we let Cb = $93M

Thus the max we can spend this upcoming year, the max Ct can be, is $93M.

Right now Ct if we perform all the projects is > $93M so we cannot perform all projects.

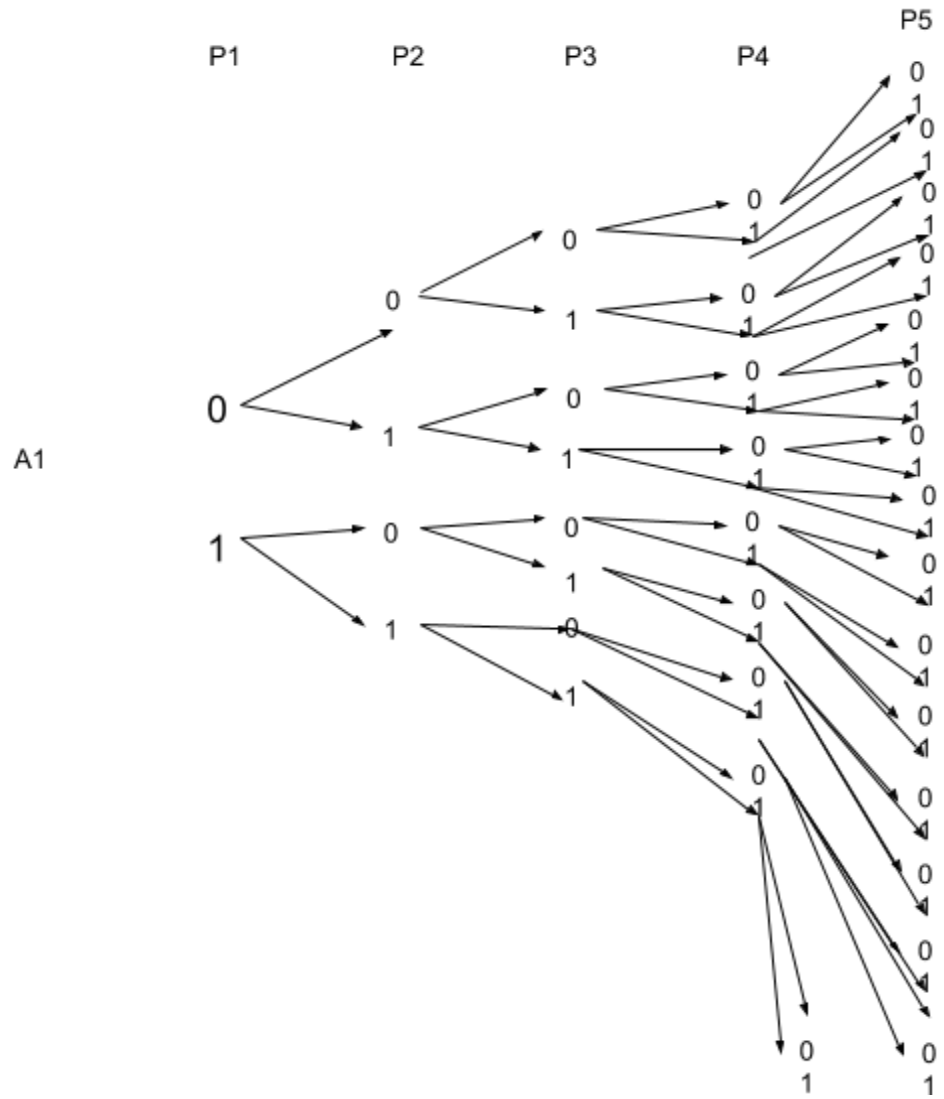
Step 7: Pose the optimization problem (aka the capital budget problem; integer programing problem).

We want to maximize the cumulative EMV, Vt, subject to the budget constraint cum. cost Ct = sum from i=1 to n of Ai*Ci <= Cb. The solution of the optimization problem (4,5) gives us

an Ai value for each project, i = 1,2,…,n. If Ai = 1 we perform the project, if Ai = 0 we reject the project.

SP2: Use the “table-lookup” method to determine which projects to pursue.

Step 1: Lay out all possible project combinations and the integer associated with them.



32 combinations: {0,0,0,0,0}, {0,0,0,0,1}, {0,0,0,1,0}, {0,0,0,1,1}, {0,0,1,0,0}, {0,0,1,0,1}, {0,0,1,1,0}, {0,0,1,1,1}, {0,1,0,0,0}, {0,1,0,0,1}, {0,1,0,1,0}, {0,1,0,1,1}, {0,1,1,0,0}, {0,1,1,0,1}, {0,1,1,1,0}, {0,1,1,1,1}, {1,0,0,0,0}, {1,0,0,0,1}, {1,0,0,1,0}, {1,0,0,1,1}, {1,0,1,0,0}, {1,0,1,0,1}, {1,0,1,1,0}, {1,0,1,1,1}, {1,1,0,0,0}, {1,1,0,0,1}, {1,1,0,1,0}, {1,1,0,1,1}, {1,1,1,0,0}, {1,1,1,0,1}, {1,1,1,1,0}, {1,1,1,1,1}

Step 4: Create the table look-up.

C1 = 10.75M C2 = 10.75M C3 = 26.25M C4 = 21.25M C5 = 54.5M
V1 = 49.98M V2 = 60.75M V3 = 191.25M V4 = 210M V5 = 364M

Project Combinations (A1,A2,A3,A4,A5)	Cumulative cost (C = A1C1 + A2C2 + … + A5C5)	Cumulative EMV (V=A1V1 + A2V2 + … + A5V5)
0,0,0,0,0	0	0
0,0,0,0,1	54.5	364
0,0,0,1,0	21.25	210
0,0,0,1,1	75.75	574
0,0,1,0,0	26.25	191.25
0,0,1,0,1	80.75	555.25
0,0,1,1,0	47.5	401.25
0,0,1,1,1	102.0	765.25
0,1,0,0,0	10.75	60.75
0,1,0,0,1	65.25	424.75
0,1,0,1,0	32.0	270.75
0,1,0,1,1	86.5	634.75
0,1,1,0,0	37.0	252.0
0,1,1,0,1	91.5	616.0
0,1,1,1,0	58.25	462.0
0,1,1,1,1	112.75	826.0
1,0,0,0,0	10.75	49.98
1,0,0,0,1	65.25	413.98
1,0,0,1,0	32.0	259.98
1,0,0,1,1	86.5	623.98
1,0,1,0,0	37.0	241.23

1,0,1,0,1	91.5	605.23
1,0,1,1,0	58.25	451.23
1,0,1,1,1	112.75	815.23
1,1,0,0,0	21.5	110.73
1,1,0,0,1	76.0	474.73
1,1,0,1,0	42.75	320.73
1,1,0,1,1	97.25	684.73
1,1,1,0,0	47.75	301.98
1,1,1,0,1	102.25	665.98
1,1,1,1,0	69.0	511.98
1,1,1,1,1	123.5	875.98

Step 5: In the table, locate the column that has the highest cumulative EMV for which the cumulative cost doesn't exceed the total budget constraint.

The budget constraint is $93M. The column with the highest cumulative EMV for which the cumulative cost doesn't exceed the total budget constraint has the value $634.75M with a cost of $86.5M. The project combination the company should pursue during the next year are projects 2,4, and 5.

SP3: How much cash is left over.

Step 1: What is the total cost of the projects to be pursued.

-- $86.5M

Step 2: Subtract that value from the total budget constraint.

$93M - $86.5M = $6.5M is expected to be left over at the end of the year.

Projects to be pursued in the next year	Expected Monetary Value	Expected Total Cost	Cash left over at the end of the year
Project 2: E2 Project 4: P2 Project 5: R&D	$634.75M	$86.5M	$6.5M

Step 4: Check Your Work.

I believe my assumptions are reasonable and my work is correct.

Step 5: Learn and Generalize.

Assuming the probabilities and expected profit concerning each project are correct, my assumptions will have no effect on my answer. The combination of projects that gives us the greatest Expected Monetary Value while staying within the capital budget for the year, were projects E2, P2, and R&D. They gave us an expected Monetary Value of $634.75M with a total cost of $86.5M and $6.5M cash left over.

3. House of Quality for video game consoles.

3.1) Identify the competitors in the video game console market in the 1990s, and the key game console products associated with each competitor? Dissect one of these competitor's video-game consoles using the Function Analysis System Technique (FAST), and present the results in a FAST diagram.

3.2) Using your FAST diagram and additional internet research if necessary, make a list of key consumer needs and product specifications for a generic video game console.

3.3) Provide a step-wise process for developing a HOQ for any product and then implement this process to create the HOQ for the proposed "Exbox" game console.

3.4) As part of your HOQ, benchmark the proposed "Exbox" game console against 2 competing products, both with respect to customer needs and with respect to technical metrics.

3.5) Develop a list of target specifications for customer needs, and a list of target technical specifications for the specifications for the proposed "Exbox" game game console in the late 1990s.

Step 1: Define the real problem.

SP1: Identify competitors in the video game console market in the 1990's and dissect one of their consoles using the FAST technique. Create a FAST diagram.

SP2: Make a list of key customer needs and product specifications for a generic video game console.

SP3: Provide a step-wise process for developing a HOQ for any product and implement this to create the HOQ for the proposed "Exbox" game console.

SP4: Benchmark the "Exbox" against 2 competing game consoles from the 1990's, both with respect to customer needs and with respect to technical metrics.

SP5: Develop a list of target specifications for customer needs, and a list of target technical specifications for the specifications for the proposed "Exbox" game game console in the late 1990s.

Step 2: Prepare to solve the problem.

Assumptions: I am an engineer at Microsoft developing a HOQ for a potential new video game console to help management decide what functions and features it needs to perform.

What information is there: Handouts and readings on the course website describe how to develop the FAST diagram and the HOQ. Internet research can help me perform the benchmarking necessary.

SP1: FAST diagram of a 90's video game console.

Step 1: Understand how video game consoles work by researching online.

Step 2: Make a structured list of the important subsystems and components that are relevant.

Step 3: Make a list of the main functions and the key sub-functions of the product.

Step 4: Write down the main function for the system.

Step 5: Organize the "bones" of the FAST diagram by working from the outsides in.

Step 6: Create a FAST diagram for our product.

SP2: Customer needs and product specifications for a generic video game consoles.

Step 1: Make a structured and prioritized list of customer needs for video game consoles based on market research. Rate these needs on a 1-10 scale of importance.

Step 2: Make a list of technical metrics and assess the importance of each metric on a 1-10 scale.

SP3: Process to develop a generic HOQ, and a HOQ for video game console.

Step 1: Develop the process for creating a HOQ for any generic product.

Step 2: Apply the process from step 1 to video game consoles.

SP4: Benchmark the "Exbox" against two competing game consoles from the 1990's.

Step 1: Find two competitive game consoles from the 1990's.

Step 2: Get the competitive metrics for these products, and measure them against the technical metrics we established for our game console.

SP5: Develop the technical metrics for the products.

Set the technical metrics for the product based on industry standards.

Step 3: Execute the plan.

SP1: FAST diagram of a 90's video game console.

Step 1: Understand how video game consoles work by researching online.

-- Sega Genesis and Sony Playstation

-- The software kernel is the interface between the various pieces of hardware

-- DVD drives allow game data to be read and stored

-- A video signal that is compatible with televisions allows the player to see what is happening in the game.

-- A sound system playing the sounds that occur in the game.

-- A dedicated graphics processor that provides specialized mapping, texturing and geometric functions, in addition to controlling video output.

Step 2: Make a structured list of the important subsystems and components that are relevant.

System	Subsystems	Components
Video game console	Kernel (OS)	CPU
	Data reader/storage	Graphics chip
	Video signal	RAM memory
	Graphics processor	Power supply
	Audio processing	HDMI cables
	Input System	DVD reader
		Audio output
		User Control Interface

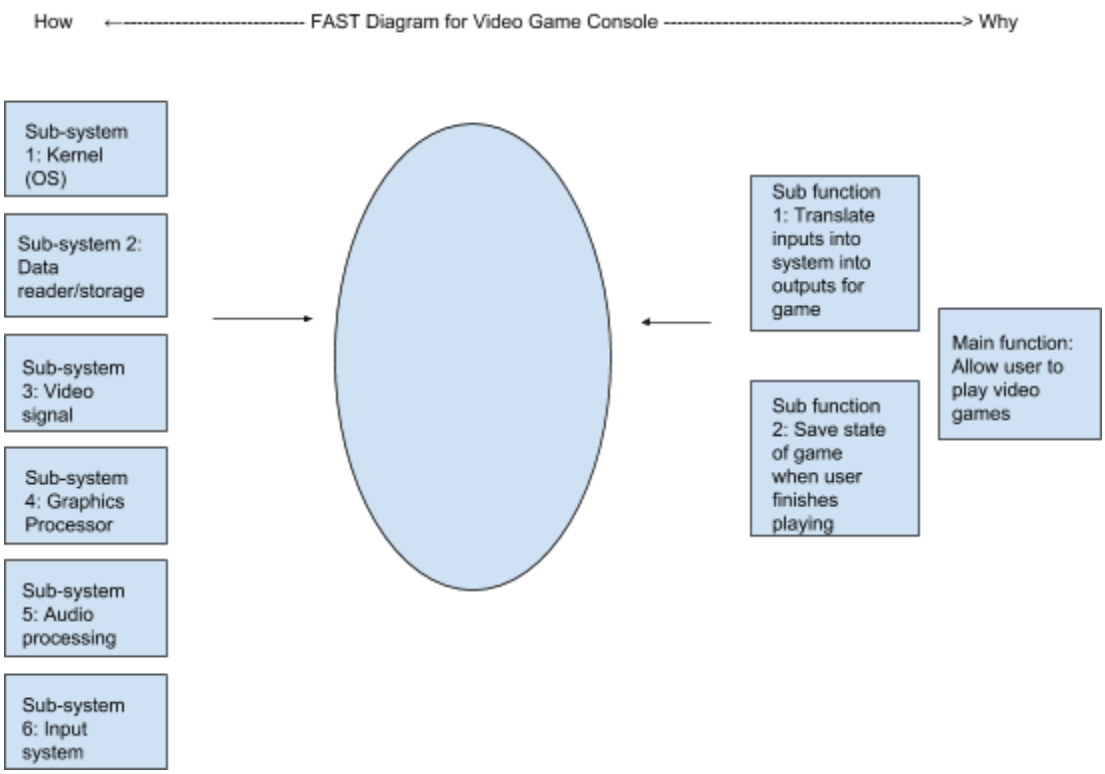
Step 3: Make a list of the main functions and the key sub-functions of the product.

Main Functions	Sub-function
Allow users to play video games.	- Allow users to play through games, taking inputs from the user, and showing what happens in the game based on those inputs. - Display game graphics on television - Play audio
Save state of game for each game the user plays	- Track place where user is in the game - Save whatever metrics related to the game user has acquired when they stop playing.

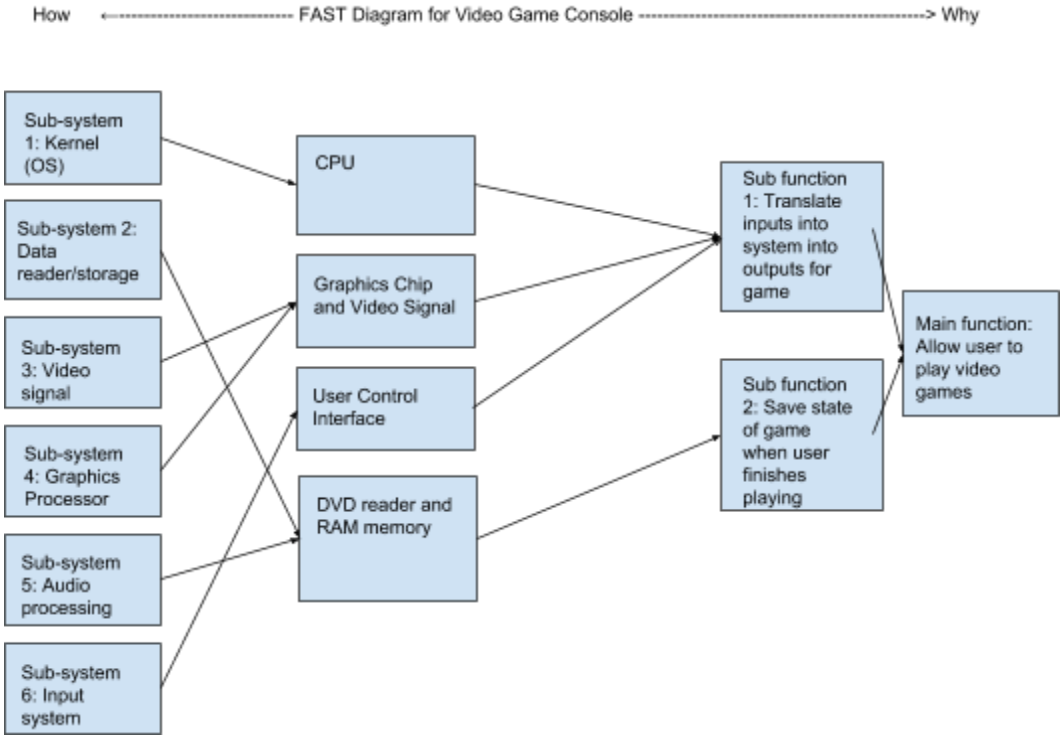
Step 4: Write down the main function for the system.

To allow users to play video games, saving the state of each game the user has played so they can begin playing from the point they last stopped playing any particular game.

Step 5: Organize the “bones” of the FAST diagram by working from the outsides in.



Step 6: Create a FAST diagram for our product.



SP2: SP2: Customer needs and product specifications for a generic video game consoles.

Step 1: Make a structured and prioritized list of customer needs for video game consoles based on market research. Rate these needs on a 1-10 scale of importance.

No.	Customer Need	Importance
1	See graphics of video game	9
2	Hear audio corresponding to what's occurring in game	8
3	Be able to enter input to control what's happening in game	9
4	Be able to start from last place they saved a game	9
5	Be able to play many different games	7
6	Console needs to read data from games entered	9

Step 2: Make a list of technical metrics and assess the importance of each metric on a 1-10 scale.

No.	Needs #	Metric	Importance	Units
1	1	Graphics Chips and Video Display	9	Binary
2	1	Memory dedicated to Graphics	8	Int
3	1	Number of colors	5	Int
4	2	Audio output	8	Type
5	3	User control Interface	7	Type
6	4	RAM memory size	8	Int
7	5,6	Has game reader	7	Binary
8	5,6	Type of game reader	5	Type
9	1,2,3	Microprocessor size	7	Bits

SP3: Process to develop a generic HOQ, and a HOQ for video game console.

Step 1: Develop the process for creating a HOQ for any generic product.

i) Create the lists of customer needs and technical metrics

ii) Correlate customer needs and technical metrics using a convenience scale (i.e. positive correlation: +, negative correlation: -, no correlation:). The result is a correlation matrix.

iii) Correlate the technical metrics to each other using a convenient scale, and place the top half of the matrix on top of the list of technical metrics to make the roof of the house.

iv) Benchmarking: Assess a set of competing products from the viewpoint of the customer (customer benchmarking), and from a technical (engineering) viewpoint (technical benchmarking) using a convenient scale for the customer benchmarking, and engineering units of measurement for the technical benchmarking. Will be done in SP4.

v) Setting targets for the customer needs and the technical metrics for a new product. Will be done in SP5.

Step 2: Apply the process from step 1 to video game consoles.

i) Technical metrics and Customer Needs have already been created in SP2.

ii) Correlate customer needs and technical metrics using a convenience scale (i.e. positive correlation: +, negative correlation: -, no correlation:). The result is a correlation matrix.

High positive - ●
Medium positive - ○
Medium negative - ◇
High negative - ◆
No correlation -

	Graphics Chips and Video Display	Memory dedicated to Graphics	# colors	Audio output	User control Interface	RAM memory size	Has game reader	Type of game reader	Microprocessor size
See graphics of video game	●	●	●			◇	○		●
Hear audio corresponding to what's occurr				●	○		○		●

ing in game									
Be able to enter input to control what's happening in game					●		○		●
Be able to start from last place they saved a game						●	○	○	
Be able to play many different games							●	●	
Console needs to data from							●	●	

games entered									

iii) Correlate the technical metrics to each other using a convenient scale, and place the top half of the matrix on top of the list of technical metrics to make the roof of the house.

High positive - ●
Medium positive - ○
Medium negative - ◇
High negative - ◆
No correlation -

	Graphics Chips and Video Display	Memory dedicated to Graphics	# colors	Audio output	User control Interface	RAM memory size	Has game reader	Type of game reader	Microprocessor size
Graphics Chips and Video Display	●	●			○	◇			●
Memory dedicated to Graphics		●				◇			
# colors			●						●
Audio output				●					●
User control					●				

Interface									
RAM memory size						●	○		
Has game reader							●	●	
Type of game reader								●	
Microprocessor size									●

SP4: Benchmark the “Exbox” against two competing game consoles from the 1990’s.

Step 1: Find two competitive game consoles from the 1990’s.

-- The Sega Genesis and Sony Playstation are the two competitive game consoles I will look at.

Step 2: Get the competitive metrics for these products, and measure them against the technical metrics we established for our game console.

No.	Needs #	Metric	Imp	Units	Sega Genesis	Sony PlayStation
1	1	Graphics Chips and Video Display	9	Binary	Yes	Yes
2	1	Memory dedicated to Graphics	8	Int	64kB	1 MB
3	1	# colors	5	Int	512 (61 can be displayed at any time)	16.7 million

4	2	Audio output	8	Type	Yamaha YM2612 FM synthesizer	16-bit, 24 channel ADPCM
5	3	User control Interface	7	Type	Controller (D-pad)	Controller with directional buttons
6	4	RAM memory size	8	Int	72kB	2 MB
7	5,6	Has game reader	7	Binary	Yes	Yes
8	5,6	Type of game reader	5	Type	ROM cartridges	CD's
9	1,2,3	CPU size	7	Int	16/32 bit	32 bit RISC MIPS R3000A

Rank how well the two consoles meet consumer needs, and how well our product stacks up in competition.

No.	Customer Need	Imp	Sega Genesis	Sony PlayStation	Our console
1	See graphics of video game	9	6	10	8
2	Hear audio corresponding to what's occurring in game	8	7	8	10
3	Be able to enter input to control what's happening in game	9	6	8	7
4	Be able to start from last place they saved a game	9	7	9	10
5	Be able to play many different games	7	7	10	10
6	Console needs to read data from games entered	9	8	8	8

SP5: Develop the technical metrics for the products.

No.	Needs #	Metric	Units	Value
1	1	Graphics Chips and Video Display	Binary	Yes
2	1	Memory dedicated to Graphics	Int	1 MB
3	1	Number of colors	Int	4.2 million
4	2	Audio output	Type	32 bit, 48 channel ADPCM
5	3	User control Interface	Type	Controller with D-pad
6	4	RAM memory size	Int	2.5 MB
7	5,6	Has game reader	Binary	Yes
8	5,6	Type of game reader	Type	CD's
9	1,2,3	Microprocessor size	Bits	32 bit

Step 4: Check Your Work.

I believe my assumptions are reasonable and my work is correct.

Step 5: Learn and Generalize.

The new video game console we are producing needs to perform two main functions, allowing users to play various video games, and saving the state of each game when they stopped playing. There are also various customer needs and technical metrics the console needs to perform. Create a HOQ allowed me to map customer needs to technical metrics we can set as development goals for the product, and allowed me to compare those goals to other consoles in the market. The Sega Genesis and Sony PlayStation were two of the biggest consoles in the market during the 90s. The PlayStation was considered the best console on the market, and I believe our product, the "Exbox", matches up well with it and should do well upon entry into the market.