

ENTREPRENEURSHIP: A GAME OF RISK AND REWARD PHASE II: THE START-UP

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ABSTRACT

ENTREPRENEURSHIP is a single person or single team, multi-phase business game. Its purpose is to provide a business game environment for participants who wish to play a computerized game that replicates some of the decisions which entrepreneurs must make and will, in turn, receive the possible rewards associated with these risks. This game simulates the development of the first five years of a technology-related firm. The game opens at the opportunity recognition stage with a simulated decision-cycle of one week. After an opportunity has been selected, the decision and reporting cycle becomes monthly until after the product has been developed and introduced into the marketplace. Thereafter, the decision making will be on a quarterly basis. The reporting cycle will follow the same time frames as the decision cycles. Any time the firm does not have the cash on hand to meet its payroll, the firm is deemed "Bankrupt." The primary benefit of this game is that it provides an opportunity for the player to perform an autopsy of the firm's failure. If the firm fails, the players are allowed to play it again, hopefully using what was learned in the failure to their benefit. If the player successfully completes the first five years, the game terminates and the player is congratulated as being a successful (simulated) entrepreneur.

THE GAME

The game ENTREPRENEURSHIP is a non-market competitive computer simulation of a Start-up firm. In this game, as in most entrepreneurial ventures, the entrepreneur does not face market-place competition until his/her firm has been established, the start-up completed and the product has been developed and entered into the market-place. This game simulates the firm's development from the search for an opportunity, the process of starting the firm with its new product concept through the product's launch and until the product has been established in a market place. The game has a simulated five year time horizon.

The first phase simulates the Opportunity Recognition Phase and uses a weekly decision cycle. The second phase is the Start-up Phase and uses a monthly decision cycle, and the third phase is the Product Launch Phase and uses a three month decision cycle.

The game reports the current simulated date as the week, month and year after the game has started. The game operates assuming of four week months and 12 months per year. It assumes an eight hour, five day work weeks for employees. The management-partner, the game player's role, is expected to work at least 50 hour weeks, but the anticipated work time is a decision variable. The inventor-partner will break the 50 hour week rule whenever s/he is working directly with the entrepreneur-partner. The game does not account for holidays, vacations, or any other non-working time periods. It simply assumes the time outside the four week months are unaccountable.

During the "Start-up Phase" at non-random times, the game schedule's evening and week-end events for the entrepreneur and the player has an option of not participating in these meetings, but scheduling or not scheduling these meetings may lead to unexpected consequences. While the paper refers to the player as singular, this role may be played by a team of players.

THE START-UP

After the opportunity selection, the entrepreneur and the inventor figuratively get together and between the two, have an initial pool of money. (This is an administrator controllable parameter initially set by a random generator and should be in the neighborhood of 1,500,000 US dollars/Euros or any currency desired to be used). This amount will not be enough money for the firm to complete its Start-up Phase, thus the firm will need to raise more money from a variety of sources, including the three Fs (family, friends and fools Angel and Venture capital are also possibilities.

WHAT IS KNOWN WHEN THE GAME GETS TO PHASE II.

During Phase I, the Search for Opportunity, many of the parameters that will be used in Phase II, the Start-up (described in this paper). These are listed below. Phase I of this game was presented at ABSEL 2009.

1. The initial unit sales potential forecast distribution for the five years after the product has been introduced into the market. This forecast is a non-symmetric distribution with 3 points provided to the player; the expected value, the upper 10% point, where there is a 10% chance the demand will be greater than the number provided and the lower 90% point, where there is a 90% probability that the demand will exceed the number provided. (The actual unit forecast is generated, but it will not be revealed to the player, only the 3 points in the distribution are ever revealed. (The actual unit-sales will be affected by the price, promotion and the quality aspects of the actual product produced.)

These three points represent an optimistic, an expected value and a pessimistic estimate of possible outcomes. These 3 point estimates are frequently

uses in entrepreneurial ventures.

2. A non-symmetric distribution of the amount of time needed to develop the product until it can be ready for a market test is determined during Phase I of the total game. An estimate of the amount of time needed for product development will be provided to the player at that time. It however estimates for the necessary development time will be biased – underestimating the actual time with the degree of underestimation being reduced after the development process reaches its halfway point. The bias will be normally distributed with an expected value of 20% and a standard deviation of 5%. (The game administrator will know the actual time to completion, but it will not be revealed to the player.) After the halfway point, the bias of the expected time until the product development has been completed will gradually be decreased.
3. The distribution of unit cost of materials for the finished product (after the 100th unit) has been determined in Phase I. The player will see the parameters of the distribution, but will again not be told the exact amount of the unit materials' cost until the 100th product is manufactured. However the game administrator will know the actual cost

The first screen after the decision to start up the firm Exhibit 1

The current simulated time is: Week: **ww** Month: **mm** Year: **yy**

Congratulations, you and **Dr. nnnn nnnn** have formed a new venture. Your firm will be developing the **product nnn nnn nnn** and as soon as it is ready for the market, the firm expects to sell it in the **xxxxxxx** in the B2B marketplace. You currently have a cash balance on hand of **\$\$\$\$** and it is deposited in the West Bank of the Mississippi.

The inventor and you have incorporated your firm with 1,000 shares of authorized stock, each with a par value of \$1. You have contributed a substantial sum of money to this venture, which you have raised by mortgaging your home, cashing in your 401k retirement savings and borrowing against you and your life-partner's life insurance policies. You also borrowed money from your family and your life-partner's family. Your cash investment is **\$1,\$1\$1,\$1,\$1\$1**. Your business partner **Dr. Nnnn nnnn** has put-up **\$2,\$2,\$2,\$2\$2** in cash and has transferred the rights of his invention to the new venture. Thus, you have a cash balance in the West Bank of the Mississippi of **\$\$\$\$** and an invention which you wish/the firm expects to turn into a viable and valuable product. The two of you have decided to each claim 200 shares of the authorized stock; leaving 600 shares to be issued in the future when the time comes that you need to raise more equity.

In order to maintain some viable standard of living, you need to determine an amount of money that your new firm will pay each of the partners as salary.

The amount of the salary each partner is to be paid per month will be: \$ _____

This amount may be increased or decreased at the beginning of every decision period in the future.

The business plan is expected to take about **hhhh** hours of effort and there is a 90% chance that the business plan will require more than **hhhh** hours and there is a 10% chance that the business plan can be completed **in** no more than **hhhh** hours.

- at the beginning of the Start-up stage of the game.
4. An estimate of the unit direct labor costs of the finished product, after the 100th unit will be provided. Like the unit materials costs the player will see the parameters of the distribution, but will not be told the exact amount of the unit labor cost until the 100th product is produced. (The game administrator will know the exact value.)
 5. An estimate of the learning curve for unit labor costs will be provided. The player will only know the distribution parameters but will not be told the exact value. (Again, the game administrator will know the exact value.)
 6. An estimate of the learning curve for the reduction of unit raw material costs will be provided. The player will know the distribution parameters but again will not be told the exact value. (And the game administrator will know this value.)
 7. The player will be provided an estimate of what the market might pay for the 100th unit of the product. The actual demand-price relationship will not be determined until the 100th product has been sold.
 8. The value proposition of the product will be provided in the opportunity recognition stage.
 9. The market segment(s) that makes up the expected target market(s) will be provided in the opportunity recognition stage.

As soon as Phase II, the Start-up Phase, has begun, the game calculates a 100 point probability distribution of the time requirements needed to complete of the business plan

and alerts the player of these times estimates by using the 90th percentile point, the expected value point and the 10th percentile point of this generated distribution. These three points of this distribution will be revealed to the player on the first report screen of the Start-up Phase.

WHAT DECISIONS CAN BE MADE DURING PHASE II OR THE START-UP PHASE?

The Start-up Phase includes those activities necessary to develop and manufacture the product, take it through its beta test and then introduce the product to the market place for the first three to six months of customer sales. Exhibit 1 the first screen the player sees in the Start-up Phase of the simulation. Exhibit 1 displays the first screen.

The player's cash investment is determined by a normally distributed random number generator with a mean of \$1,000,000 and a standard deviation of \$200,000. The inventor partner's cash investment is distributed in the same fashion with a mean of \$500,000 and a standard deviation of \$100,000.

Exhibit 2 displays the second screen of the Start-up Phase. Note that screen two states some necessary tasks to be done.

Note: all the specific values listed in the above screen are parameters and while they initially have values set by the game designers, the game administrators may alter these parameters.

During the Start-up Phase, the entrepreneur will often have more to do than he/she can get done. Many of the decisions typically end up being "what will need to be post-

The second screen after the decision to Start-up the firm Exhibit 2

After the firm's founding, it will need office space; locating that space has consumed two weeks of time for both you and your inventor-partner. The cost of this space will be \$1,000 per month plus a utilities cost of \$150 per month. You have rented enough space for the two founders, a secretary and one future new employee. This amounts to 500 square feet of office space plus another 500 square feet of open space that can be used as a product development laboratory. Each new professional whom you hire (after the first) will require additional office space of 100 sq feet costing an additional \$200 per month and an added utilities cost of \$25 per month. You have a 75% chance that any needed office space can be rented in the current building. If the office space can be found in the current facility it will require a week of your time to rent it and prepare it for use. Your inventor-partner can use this time to continue with the product development process. If you cannot add space in your current facility, you will need to find a new office space which will require a month (200 hours) of your time and two weeks (100 hours) of your inventor-partner's time. In addition, moving offices will consume one week (50 hours) of both partner's time and a week (40 hours) of every employee's time. After you hire your first professional employee, you will now need a secretary to support you, your partner and the professional employee. You will need one additional secretarial support person for every three professional employees during this phase of the game. The hiring of a secretarial support person requires about 20 simulated hours of the player's time and about five hours of time from each of the employees. Each secretary is to have a monthly salary of \$4,000 that, when the benefits and taxes are included, costs the firm \$6,000 in cash per month. In addition, each secretary uses an expected \$400 worth of office supplies (normally distributed with a standard deviation of \$100) each month.

poned.” The choice to postpone constitutes a decision. The game combines product development, funding, and the selection of additional employees to the firm business processes during a single stage because these processes take place either simultaneously or in close time proximity. Exhibit 3 shows the initial results as displayed to the player.

Since the firm is in the Start-up mode, it has no revenues—only expenses. Any infusion of cash is the result of the sale of equity or loans. The accounting process is reported on a cash basis, and thus it reports the “burn rates” of the cash on hand. The resource most precious during the Start-up stage of the business is the partners’ time.

The game provides a list of tasks that must be accomplished for the business to succeed and the player prioritizes the activities that he/she thinks are the most important to success.

Toward the end of the Start-up Phase, some sales revenue will start to accrue to the firm. During this phase of the game, it is assumed that all sales result in full payment in cash at the point of delivery. This assumption will be changed for the Phase III of the simulation – The Market Entry Phase (not described in this paper).

THE PRIORITY SYSTEM FOR THE “TO-DO” LIST

The player is presented with a screen that asks the player to list all the activities that he/she wants to engage in during the ensuing month and to prioritize each activity on a 3 point scale; high priority, medium priority or low priority. Note that the Technology Partner is willing to work at the rate of 200 hours per month (50 hours per week) or will

work for the same number of hours that the player schedules of his/her time except for when the two must work jointly on the details of running the firm. All employees are expected to work 160 hour-months and work in their specialty areas unless they are required to do other non-regular tasks such as interviewing a secretary.

If events occur that require the player’s immediate attention these events will cause the postponement of tasks with priorities lower than 2. Thus, Priority 3 tasks are postponed first, and priority two tasks are postponed if, and only if, there are no more priority three tasks remaining on the “to do” list. If all Priority three and two tasks are postponed, the amount of time committed to working is increased. Please note that it is possible for a situation to arise where the player must work long hours on this new venture. Very long work times may cause undesirable social consequences in this game.

Mandatory and necessary tasks will be scheduled by the game and discretionary tasks are to be scheduled by the player. That is, the game itself may schedule some events like being sick or covering some other time consuming tasks that are the consequences of a decision, such as finding new office space if the current contract is canceled or if hiring a new employee requires more office space.

Exhibit 4 displays the list of tasks that the player needs to schedule and their codes. The input routine asks the player to record the task code, and the desired priority of each task. The program first determines the intervening issues and the amount of time each requires and then schedules the players remaining amount of time according to the player’s priorities. The program updates all the needed tasks and calculates the amount of remaining time

The initial results screen Exhibit 3

The current simulated time is: Week **ww**; Month: **mm**; Year: **yy**

You have sub-leased space from a firm in a local office park. The firm has allowed you to use 1,000 sq. ft. of currently unneeded space. This space is arranged in four small offices (500 sq. ft.) plus another 500 sq ft of laboratory space. This space will cost \$1.00 per sq. ft. per month plus an allocated utility contribution cost of \$150 per month. The search for this space has taken two weeks of you and your partner’s time. The contract for this leased space may be canceled with 30 days notice by either party. Rent and utility contributions are paid in advance at the beginning of each month. You and your partner have spent two additional weeks moving into this new space and getting and setting up your business’s commercial checking account, phone service, office equipment, internet connections and computer facilities. Your required deposits were \$1,000 and the initial office equipment costs were \$25,000.

The cash balance at the time you started the firm was	\$xx,xxx,xxx.
The first month’s salaries for you and your partner were	xx,xxx.
The office rent was	1,150.
Paid out deposits were	1,000.
Purchased office equipment amounted to	25,000.
	=====
Ending Cash balance at the end of the first month	\$xx,xxx,xxx.

needed for each task to be completed.

A few tasks are scheduled automatically. For instance, the game schedules a meeting of the entire team every Monday morning for a one hour session. However, once in a while at random times this meeting will require more time. The game also schedules a one-hour meeting every

Friday morning for the partners. This meeting may take more time than scheduled.

The input screen for the player's decisions is shown in Exhibit 5

The sum of the "Expected" Time Commitments sets the amount of time the player is expecting to work for the

A List of tasks that may be necessary Exhibit 4

Task	Code
1. Spending time assisting in Product Development	APD
2. Spending time working on the Business Plan	BPD
3. Spending time working on a Marketing Plan	MPD
4. Spending time forming a Board of Advisors	FBA
5. Spending time forming a Board of Directors	FBD
6. Renting Additional Office Space	ROS Sq. Ft. xxxx
7. Renting New Offices Space	RNO Sq. Ft, xxxx
8. Moving Offices to new location	MNO
9. Hiring New Product Developmental Assistant	HPD
10. Firing a New Product Development Assistant	FPD
11. Hiring Financial Specialist	HFS
12. Firing a Finance Specialist	FFS
13. Hiring an Accountant	HAS
14. Firing an Accountant	FAS
15. Hiring a Marketing Specialist	HMS
16. Firing a Marketing Specialist	FMS
17. Hiring a Secretarial Staff Person	HSW
18. Firing a Secretarial Staff Person	FSW
19. Hiring a Chief Operations Officer	HCO
20. Firing a Chief Operations Officer	FCO
21. Hiring an Accounting Firm	HAF
22. Firing an Accounting Firm	FAF
23. Looking for money from 3-F sources	L3F
24. Looking for money from Angle Capitalists	LAC
25. Looking for money from Venture Capitalists	LVC
26. Looking for money from Banks	LBM
27. Conducting an Alfa Test	CAT
28. Conducting a Beta test	CBT
29. Spending time Promoting the product to Potential Customers	PPC
30. Preparing tax Documents	PTD
31. Authorizing a stock split	ASS Split Ratio xx:1
32. Professional Staff Meeting Automatically for 4 hours per month	PSM
33. Partners Meeting Automatically scheduled for 4 hours per month	PMT
34. Meeting with Lawyers	MLE
35. Maintaining Marketing Relationships with customers	MMR
36. Purchase Lab Equipment for New Prod. Development	PLE
37. Purchase Production Equipment for Manufacturing	PME
38. Leasing Manufacturing Space	LMS Sq. Ft. xx,xxx
39. Hiring Manufacturing Employees	HME number xxx
40. Purchasing suppliers for manufacturing	SFS
41. Purchasing assemblies, sun-assemblies and materials	PAM
42. Design, Purchase, Printing catalogs and PD material	DPP
43. Amount of Budgeted Mkt. and Promo. Expenditures	AME \$xxx,xxx

month. Actual amounts of time required are generated by the game itself. If the required time is less than the expected times, time is added to other tasks selected by the game. If the actual time is greater than “expected time,” the game first cancels priority 3 tasks. If the actual amount of time continues to exceed the player’s expected work time, the game then cancels priority 2 tasks. If the actual time requirements still exceeds the expected work time, the player works more hours than s/he wanted too. From time to time, the player will be prompted to spend what may be important extra time outside his/her normal duties. This request would appear on a screen as shown in Exhibit 6.

After the product passes its Alpha test, the firm should begin purchasing manufacturing equipment, leasing manufacturing space and hiring manufacturing employees. However, a few units may be manufactured in the pilot facility within the laboratory, but this will only be enough to perform an alpha and a beta test and produce a few products to be sold in the market place. Pilot built products will have 500% greater cost than products manufactured in the initial manufacturing facility.

SOME SPECIFICS ON HOW THE GAME WORKS

The inventor-partner, (a computer player) will act as the CTO (Chief Technology Officer) and expects to spend most of his/her time in product development, but often he/she will be required to participate in hiring, renting office space and fund raising activities. These activities take away from time the inventor might otherwise allocate to product development. However, all product development professionals hired will be able to devote most of their time to product development. While paid employees are ex-

pected to work 40 hours per week for the firm, all new employees will require some job training time in order to perform their duties. Job training time requires two weeks of paid time before the employee begins to work; then each hired employee will undergo on-the-job training over the next 10 weeks. After this training, the employees are capable of producing up to their potential.

The product development consumables have an expected value of \$300 a month with a standard deviation of \$100 (no negative values will be produced). In addition, each product development employee spends an amount determined by a normal distribution with a mean of \$150 and a standard deviation of \$50.

RAISING MONEY FOR THE FIRM

The firm can raise some funds from the Three F sources or Friends and Families of the principals as well as a few other possible investors (Fools). This process requires the firm to sell an amount of equity in the firm for which the firm receives cash. The acquisition of this funding requires a significant amount of time, but this form of financing is the only source available early in the Start-up process. The search for 3F funds requires an expected three weeks to cultivate. (Expected value of 180 hours with a SD of 60 hours, normally distributed) Each effort has a 50% probability that the 3Fs will make an offer. The offer will be an amount of money for a percentage of the stock. The offer, if made, will occur on the last day of the month and the player must decide in the next decision round whether or not to accept the offer.

Angel Funds will only be available after the invention has exceeded 50% of the expected product development

**The Decision Input Screen for Phase II
Exhibit 5**

The current simulated time is: Week **ww**; Month: **mm**; Year: **yy**

Please input the tasks that you intend to undertake next month. Do not forget to include your priority rating for each task.

	Task	Priority (1, 2 or 3)	Expected time commitment in hrs.
Task 1	_____	_____	_____
Task 2	_____	_____	_____
Task 3	_____	_____	_____
Task 4	_____	_____	_____
Task 5	_____	_____	_____
Task 6	_____	_____	_____
Task 7	_____	_____	_____
Task 8	_____	_____	_____
(This list expands as needed.)			

time. The cultivation of an Angel Capitalist will require XXX number of hours to cultivate. (The expected time is 250 hours with a std. dev. of 100 hours.) Once an Angel has been found, there is a 60% probability that he/she will make an offer after the 50% level has elapsed. The more complete the business is, the better the Angel's offer will be. That is, the price per share offer will be greater as the business plan is closer to completion. The Angel will make an offer of money for stock, plus his/her assistance in raising venture capital, product and marketing development. This offer, if tenced, will occur on the last day of the month and the player must accept or reject the Angel's offer during the next decision period. Venture Funding will be impossible before the new product has passed its Alpha test and the business plan has been completed. Banks only loan money on a collateralized basis and the firm does not have any collateral until it is in the production and marketing phase of the business. (Phase III) and is not included in this paper.

Exhibit 7 shows this screen.

The information screen is divided into four parts. The very top of the screen contains a calendar; and a statement as to the estimated time remaining before any deadlines are expected to be met. The 2nd part of the screen displays the amount of time the player spent working with this venture during the previous month, and a short description of the accomplishments attained during the prior month. The 3rd part of the screen is devoted to a cash burn calculator showing the beginning cash balance, the cash expenditures and the ending cash balance. The 4th part of the screen allows the player to reduce or increase the amount of the partners draw, thus altering the firm's cash flow.

The game has emergency situations that pop-up on a random basis and these emergencies must be completed or solved ahead of any other plans.

The list of "things to do" appears on a screen just before the decision screen for the Start-up Phase of the game. The items displayed on this screen will change as time progresses simply because all possible decisions would not be available during all the iterations of the Start-up Phase. For example, Leasing Manufacturing Space would not be a valid decision until some time prior to the Beta testing of the product. Hiring Product Development Specialists would not be necessary after the invention has passed its Beta test. Exhibit 8 shows a possible early "To do" list.

ADDITIONAL INFORMATION PROVIDED BY THE GAME

The reported estimated time until the product development is to be completed is biased. The reported time needed to complete product development will be less than the amount of time it will actually take. This will be accomplished by selecting a uniform random number between 0.75 and 0.90 and multiplying it by the actual number determined in the initial process. After all, product development times are almost always under estimated. The same process will be done to the time needed to complete the business plan. Exhibit 5 shows this scheduling input screen.

After the input screen has been completed, one or more screens may appear, if needed, asking for more specific information. An example would be where the player expects to fire someone. The screen inquires as to which employee is to be fired. Again the time requirement for firing has a mean of four hours and a standard deviation of one hour. The person will leave work immediately but will be paid until the end of the current month.

The results of the decisions will be shown on an output screen similar to that shown in Exhibit 4.

THE DETERMINATION OF THE EFFICIENCY AND ABILITIES OF THE PROFESSIONAL WORKERS

When a professional is hired, a random number is generated, which determines the abilities and efficiency of the worker. This efficiency variable is normally distributed, and it has a mean of 60 for workers without prior work experience and a standard deviation of 10 when the person begins working. However the longer a professional works, the more efficient they become. This "learning curve" is calculated using as follows:

Efficiency in time period ET_1 which is defined as the efficiency of the worker the month the person is hired. $ET_2 = \text{Efficiency in } ET_1 * E_1$ where E_i has the following values: $E_1 = 1.01, E_2 = 1.02, E_3 = 1.03, E_4 = 1.05, E_5 = 1.08, E_6 = 1.08, E_7 = 1.05, E_8 = 1.03, E_9 = 1.02, E_{10} = 1.01$, and all other E

Request to spend some time giving back to the community Exhibit 6

You have been invited to join the **Technology Executives Roundtable**. It meets every 3rd Thursday of the month for an evening dinner meeting with discussion among members of the problems of entrepreneurship. It costs \$50.00 per month. There are about 50 members. All are senior officers of young technology based firms Do you wish to join? [] YES [] NO

values = 1.00 and ET_1 is the initial value of the random variable determining the initial efficiency of the worker.

Thus, if a professional employee works 160 hours a month and the efficiency random variable associated with the worker is 90, the effective monthly hours for this person would be 144 or this person would accomplish 144 hours of work during their 160 hours of time spent on the task. When a professional is performing poorly, the player may fire him/her, but it requires the player to spend the hours need to fire a person, and then the player needs to hire a replacement, or he does not fill the vacant position.

INFORMATION ON HIRING

When the player wants to hire a specialist, the player gets to see a set of three candidates for a specific time commitment sequentially. Like the opportunity search, when the player rejects a potential hiree, he/she never sees that person again and when they hire a person, they can never

see a following candidate's information.

INFORMATION ON THE SPECIALISTS

Age and experience reflect salary demands. The work experience of the potential employee is randomly assigned with the work experience in the specialty is a uniformly distributed between 0 and 20 years. The age is the work experience plus a uniformly distributed random number between 22 and 45. Note that older workers have more experience. Each specialist has a "price" or a salary requirement associated with him/her and each has a gender and age associated with him/her as well as an indication of the amount of prior work experience in the field and an estimate of how efficient the worker may be.

The actual quality or efficiency of the worker at the start of his/her employment is determined by taking the parameter of a worker without experience (60) and adding the experience parameter value divided by two. The estimate of this efficiency provided to the player would be this

The report screen during the Start-up Phase Exhibit 7

The current simulated time is: Week **ww**; Month: **mm**; Year: **yy**

You have an expected **xxx** hours of effort remaining until the invention has reached the 90th percentile of its expected product development completion time and an expected **xxx** hours of effort until the first draft of your business plan is 90% completed. Last month, you spent **zzz** hours working with your new venture.

You and your partner have spent your time during the last month doing the following:

- 1) # of hours Doing:
- 2) # of hours Doing:
- 3) # of hours Doing:

List continues until all the time spent has been accounted for.

Your cash burn rate for last month was as follows:

	Beginning Cash: xx,xxx,xxx
Salaries for the two partners:	xx,xxx,xxx
Salaries of other employees:	xx,xxx,xxx
Rent:	xx,xxx,xxx
Office supplies:	xx,xxx,xxx
Expense account expenditures:	xx,xxx,xxx
Overhead:	xx,xxx,xxx
Product development costs	
Consumables:	xx,xxx,xxx
Utilities:	xx,xxx,xxx
Costs of Capital Equipment:	xx,xxx,xxx
Taxes:	xx,xxx,xxx
Total Cash Expenditures:	xx,xxx,xxx
	=====
Cash Balance at the end of the month:	xx,xxx,xxx

I wish to change the partners' salaries by \$_____ per month. (A negative value means you are reducing the salaries and a positive value indicates you are increasing salaries.)

A “to-do” List Exhibit 8

Hire a product development specialist. Code HPD

After training, the PDS could decrease the elapsed time until the invention was ready for the market. This person should be able to spend 40 hours a week working on product development. The invention is expected to require XXXX more hours in product development before it is ready for Alpha testing. This hiring process is expected to require about 40 hours of your time to find and interview three candidates. The selection of one employee from the three candidates will require another 20 or so hours. This person is to be supervised by the product inventor. Supervision requires an expected five hours per week of your partner’s time, which cannot be use for product development. (This supervision time is a random variable selected from a normal distribution with a mean of 5 and a standard deviation of 5 with a minimum of three hours per week for the first month.) The more time this person is employed the less time will be needed for supervision.

Hire a finance specialist. Code HFS

The financial specialist’s task makes it easier to find funding in the future. As the CEO it will be your job to supervise this person. Job supervision parameters will be the same as the Product Development specialists. The presence of a financial specialist reduces the expected time and its standard deviation of finding a money source by one hour each month employed for five months, when it stabilizes, with the minimums remaining constant. The presence of a financial specialist increases the amount of money per share of stock in the transactions by increasing the amount of funds offered by an average of 1% per month for the first six months of employment and the rate would stay constant after six months. The first financial specialist hired becomes the firm’s CFO.

Spend time assisting the product development process. Code APD

Remember the CEO is not a product development specialist. For each actual hour of effort, the CEO accomplished about ½ hour of simulated product development time.

Work on your Business plan. Code WBP

The business plan is the responsibility of the player. The business Plan must be completed before the firm can borrow any money or sell any equity in the firm except for 3F funds. In the 3F case, the firm may raise money from this source with the Business plan being at least 50% completed. The Business plan is expected to require about XXX hours of effective effort. Now at this point in time, the firm has completed only ZZZ hours of effort on its business plan.

Important Note when the CEO works on the Business Plan the inventor partner puts in 25 % of the amount of time the CEO devotes to the plan, which is time he/she cannot devote to product development.

Form an Advisory Board for your new company. Code FAB

This process could take an abundance of time before a needed four people are selected, but this time can be spread out over several months. The parameters of time consumed to locate an Advisory Board member are the same as you have in hiring a professional employee. You will need to interview and select four people to be on your Advisory Board.. A good Advisory Board needs to have a set of compatible people, each with skills that will help the firm grow. A complete four person Advisory Board must be in place for two months or more before the firm may establish a Board of Directors. Advisory Boards generally assist without pay. They may result in finding better employees and people to serve on the Board of Directors and may even help you find funding sources. The presence of a complete four person Advisory Board reduces the expected time of completing the start-up Phase.

Authorize a stock split. Code ASS/#.#

The firm was established with 1,000 shares authorized, and the two partners claimed 200 shares each. There may be times when the firm wishes to increase the number of shares authorized without altering the ownership. This is accomplished by a stock split. A two to one split would mean the firm has 2,000 share of authorized stock. The firm may need more shares in order to provide a finer division of ownership. The number of new shares would reflect the number of new shares per single old share. Thus, the entry: ASS/2.5 would result in 2.5 new shares for one share of old stock. Note that the partners and all current stockholders are not diluted by this process.

value plus a normally distributed random variable with a mean of zero and a standard deviation of five.

The demanded monthly salary is equal to \$4,000 plus (his/her age (22 to 40) plus the years of experience (0 to 20years)) multiplied by 40.

The player sees the worker's profile and salary demands and decides to hire or not to hire. Just searching for an employee and looking at the profile consumes 10 hours of time. Hiring an employee requires an additional five hours of time. The players may review only three potential employees in any one field per month. If the player rejects all three, then no one is hired, and the player has consumed 30 hours of time. Since both partners of the firm are need for the hiring process, the expended amount of hiring time is charged to both the player and inventor-partner.

Again note that all values are set by the game designers but are changeable parameters.

INFORMATION ON WHAT SPECIALISTS DO

The Product Development specialist will spend his/her time (160 hours per month less group meeting times and other non productive time) on Product development)

The Marketing specialists will spend his/her time (160 hours per month less group meeting times and other non productive time) on market development. Successful market development decreases the sales cycle, and increases demand *ceteris paribus*.

The Finance specialist will spend his/her time (160 hours per month less group meeting times and other non productive time) on the search for capital. The success of the financial specialist results in increased exposure to people with money to invest and a reduction in the cost of capital for the firm *ceteris paribus*.

The COO is needed 2 at least months before the new product goes into manufacturing prior to market sales. Actual manufacturing for the product other than prototypes and models for Alpha and Beta testing cannot take place until the COO has been employed for at least 2 months.

INFORMATION ON THE POSSIBLE UNIT VARIABLE MANUFACTURING COSTS

The expected value for the unit variable manufacturing costs \$1,000 plus requiring a time commitment from the player of X hours. An additional Y hours of time and another \$1,000 will provide the upper 90% estimate and an additional Z hours of time and an additional \$1,000 will provide the lowest 10% estimate. Estimates of the unit manufacturing costs will be crude until after the first 100 units have been manufactured.

The Alpha test on the product results is a simple pass or fail. This test requires 20 hours of time for the player and 20 hours of time for the inventor-partner and 30 hours of time for each product development professional in the firm. An Alpha test costs \$5,000. This test cannot be performed until the product is at least 80% through product develop-

ment. The probability of a successful test is a function of the time remaining in the expected product development time line. The product must pass the Alpha test before it can be Beta tested.

The result of the Beta test is based upon potential customers rating of the product and the result is a score between 50 and 150. A test score of less than 100 is considered a failure, but the product may go to market with a score of 90 or greater. However, this score is an indication of market acceptance. A score of 150 would indicate a sure winner with a rapid start in the market place. This test requires 40 hours of time in each of two sequential monthly periods for the player and 20 hours of time in each of two monthly periods for the inventor-partner and 30 hours of time for each marketing professional in each of two monthly periods. The Beta test score is a normally distributed random variable with a mean of xxx and a standard deviation of 20 and an upper bound of 150. (The mean of this distribution is equal to the number of hours of completed product development divided by the expected product development time and then multiplied by 100) The Beta test costs \$50,000. If the product scores below 90 or if the player chooses to withhold the product from the market until further product development has been completed, a new test can take place after an additional month in product development.

Better information on the manufacturing cost learning curve may be obtained after manufacturing the first 100 units. This request requires 20 hours of the player's time and requires the existence of a COO (Chief Operating Officer). Each of these estimates cost \$2,000.

Obtaining information on the unit variable manufacturing costs both time and money. 10 hours of time will provide the expected value, an additional 10 hours time will provide the upper 90% estimate and an additional 5 hours of time will provide the lowest 10% estimate. Each of these estimates cost \$1,000. This estimate is much more accurate than any obtained prior to actually manufacturing a 100 units of the product.

The upper limit on 3F Funds is a controllable parameter and is initially set at 3 million. The ratio of the exchange of company stock for 3 F Funding is also controllable. However, stock sales early in the firm's development require higher multiples than stock sold closer to the time the product is introduced into the market. This means that the earlier you seek funds, the more of your firm's equity you need to give up in order to obtain the money. The schedule of equity for money is a parameter initially set by the game designers. The time requirement to raise 3F money is about a man-month per million and requires that both principals (the inventor and the player) commit equal amounts of time to the task. The exact amount of required time is a random variable and unknown to the player, but it will not be excessive. The exact value for each opportunity to raise 3F funds will be a normally distributed random variable with a mean of 160 hours and a standard deviation of 50 hours. 160 man-hours normally equals one man

month. However, entrepreneurs are expected to spend substantially more time than that on their venture.

WHAT IS THIS GAME'S PRIMARY PURPOSE

If the player fails, that is when and if the firm goes bankrupt; the player is given the opportunity to do an autopsy of the failed firm. This is an opportunity to go back over what has transpired and analyze what went wrong and learn from his or her experiences. In actual situations, entrepreneurs are often too traumatized by the bankruptcy process to try to learn from a failed venture. And often, a single bankruptcy destroys the opportunity for another try. This game, in a true simulation fashion, allows an aspiring entrepreneur to have a simulated experience without the risks commonly associated with starting up a new business and take away a great deal of knowledge about what may go wrong in such an adventure. This is a lesson rarely taught but often experienced by entrepreneurs.

Time required to complete the game

Appendix 1

The Entrepreneurship game is designed to simulate the first four to five years of a technology based, Start-up firm. Because of the stochastic nature of the decision making process, the actual duration of the game may vary, but the game should stop after no more than five simulated years or less. The game divides this five year period into three distinct stages; the opportunity recognition stage; the Start-up stage and the market development stage. The opportunity recognition is simulated on a weekly basis, and it is expected to require between 5 to 25 very quick decision periods of 3 to 5 minutes each. The Start-up stage is simulated on a monthly basis, and it is expected to be completed within 8 to 15 decision periods. Start-up decision periods are expected to require between 10 to 20 minutes each. The final market-place stage will be simulated on a quarterly basis, and it is expected to require between 12 and 15 decision periods, each requiring from between 15 and 20 minutes per decision period.

The AD distribution

Appendix 2

The AD distribution is a created non symmetric distribution of values such that the mean of the distribution is specified and the lower the nth percent of the distribution is less than a specified value and the upper nth percentile of the distribution lies above a specified value. The AD Distribution is the combination of one half of two normal curves with the same mean but different variances. The process is first to generate random selections from a normal distribution with a mean of χ and a standard deviation of $\hat{\sigma}_1$ and excluding observations greater than its mean χ . This selection process continues until it produces N_1 valid data points. Then the process generates random selections from a normal distribution with the same mean as before (χ) but with a standard deviation $\hat{\sigma}_2$, and this second process excludes values less than its mean (χ) and continues until it has produced N_2 valid data points and $N_1 = N_2$. The parameters $\hat{\sigma}_1$ and $\hat{\sigma}_2$ are selected in a way that allows easy calculations of the lower 90% and upper 10% values for the desired distribution.

The probabilities of specific events

Appendix 3

The player needs some information on the expected time before the invention will be ready to go to market. To obtain this information, the actual time that will be required before an ALPHA test can be performed will be generated using the ED distribution. However, the time reported to the player will be less than the actual time required (The expected time needed for product development is always underestimated). The game will not allow an ALPHA test until a specific amount of product development time has elapsed. If the player attempts an ALPHA test before the real amount of time has elapsed, he/she will receive a message that the product is not yet ready for an ALPHA test.

The ALPHA test must occur before a BETA test can occur. The likelihood of passing the ALPHA test is 0.5 for the first time, 0.7 for the second time, 0.8 for the third time, 0.9 for the fourth time and 100% for the 5th time.

A successful BETA test must occur before the product can be brought to market. The probability of passing the BETA test is 0.06 for the first try, 0.7 for the second try, and 0.8 for all additional tries.

The player is given an estimated time for completing the firm's business plan. This estimate is generated in the same way as the product development time. First, a true value is generated using the ED distribution. The player is then given a low-ball estimate using the estimator bias parameters that were used in providing the low-ball estimate of product development time. The business plan must be completed before any investments by 3rd parties can be expected except for funds obtained through 3F financing. 3F funds can be raised as soon as the business plan is 50% completed, although the cost of capital in the 3F funds case is a function of the completeness of the business plan and the presence of a CFO in the firm. The amount of money offered per request is set at 1 million dollars plus a function of the completion of the business plan. This formula is the percentage of completion minus 50 percent. Thus, if the business plan was 70 percent complete the 3F funders would offer 1 million 200 thousand dollars.

In return for their money, the 3F funders expect 10 percent of the stock in the firm. This percentage of stock falls based upon the presence of a CFO and the length of time the CFO has been on-board. The percentage of stock demanded by the 3F funders goes down one half of a point for every month a CFO has been on staff after the first month and this lowering of the cost per share stops after a CFO has been with the firm for six months. An example of this calculation would be as follows: Assume a CFO has been with the firm for 4fourmonths. In this case, the shared demanded would be 8.5 percent of the company's shares. This was arrived at by counting the number of months the CFO has been on board minus one, which is 3. One half of one percent times three equals reduction of 1.5 percent, thus the request for 8.5% of the shares. Note that the greatest discount possible is equal to 2.5 % for six months of service by the CFO.