Upstream Market Research Tools Find The Facts

What Do Customers Want?

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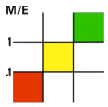
fact-gathering, analytical Marketing to steer the enterprise™



Hello. My name is Ralph Grabowski. In 37 years of Marketing, I have helped launch new products, companies, and more than seven new fields; which have grown to become worth **over ten Billion dollars**.

I am an engineer; an electrical engineer. In my career, I have suffered the **agony of defeat,** the personal and emotional grief, the stress, and the professional and financial setbacks from working for failures and being laid off. I have seen my fellow engineers suffer personal tragedies. For I have also tasted the **thrill of victory**, the personal and emotional joy, the excitement, and the professional and financial rewards from being in successful companies and from helping my fellow engineers and scientists thrive.

I would like to share with you some observations and data from those experiences. There is a reason for the special graphic in the lower right, for it is the key to success.

I earn my living as a as a startup CEO, as a Chief Marketing Officer (CMO) and VP of Marketing for startups, as a Marketing Consultant to established companies, and as a temporary executive for turnarounds and restarts. I support the institutions of technology-based business and entrepreneurship, write about Marketing, teach Marketing, and research how Marketing steers successful technology-based enterprises.

People ask me, "How did you get into Marketing?" Some Engineers in the audience even slur it derisively, "How did you get into Marrrrrrrrrketing?" as if I abandoned my roots.

View company names in the **Marketing/Engineering Investment Ratio™ data** to read alongside the talk. © Ralph E. Grabowski. All rights reserved.

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In 1969, I was a Solid-State Microwave Circuit Design Engineer pioneering new technology and a new field at Varian Associates. We developed microwave IMPATT oscillators, the solid-state replacement for the Klystron microwave oscillator, a vacuum tube.

This radical technology was as significant a development for the radar and telecommunication fields as the transistor was a disruptive innovation for general electronics.

We had the know-how and designs to produce microwave sources from the low-power milliwatt level to the high power one-Watt level over the entire useful range of frequencies and could manufacture hundreds of units a day. Varian's Silicon IMPATT diode oscillators enjoyed a **four-year technological lead** on the competition, Gallium Arsenide (GaAs) GUNN diode oscillators.

It was neat technology, but our so-called Marketing department did not perform Marketing, and could not find enough customers who would buy it. So Varian Associates threw our technology in the wastebasket and laid us all off. I had to face the agony of defeat, seeing my neat technology discarded. I went home to my wife and told her I was laid off.

My boss could not face the agony of defeat, seeing his group disbanded and his work discarded. He went home to his wife and daughters and committed suicide. (long pause)

Varian was a "Flaming Failure."

I figured out that the quality of my life depended more on the quality of Marketing that was performed – or not performed – and did not depend on technology. I entered Marketing thirty-seven years ago. Over the weekend, I went from Solid-State Microwave Circuit Design Engineer to Applicon's first marketing and sales manager where I helped launch the Computer-Aided Design (CAD) and Electronic Design Automation (EDA) fields – both – and never looked back.

These two new fields, alone, gainfully employ many thousands of my fellow engineers.

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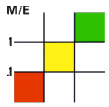
Outline

- Upstream Market Research
  - Facts and analysis to steer the enterprise
- Methods, processes, and tools
- What to do and when to do it
- Marketing investment budget



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We perform Market Research because successes invest (heavily) in Market Research, while failures don't invest in Market Research..

Three case studies, one a business basket case, the second an abandonment, and the third a stunning success, will illustrate methods, process, and tools; and when to employ them.

We will also address:

- What is radical or disruptive technology?
- What is radical or disruptive innovation?

Since this talk will feature formulas, equations, and numbers, and since we are addressing technology-base enterprises, there will be a math quiz part way though the talk. Let's practice.

Raise one hand with me. (class raises one hand)

OK, now raise both hands. Good.

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The first of our three case studies is from Becton Dickinson Medical Systems (BDMS), an

established company (BD began in the 1800s; the BDMS Division was 25 years old) with an
established product (a new feature on a 7-year-old product) in an
established market (wireless in the CCU was more than 10 years old) in an
established field (the Coronary Care Unit, CCU, was 15 years old)

Classic investment strategy states that this should be **low risk**. Classic strategy says to invest in the lower risk, and that less market research investment is required since the risk is lower. Classic strategy was **wrong**.

BDMS invested $1 million (2006 dollars) in engineering over five years, developing new patient location technology for the Coronary Care Unit (CCU).

After-the-fact Primary Market Research established that this was a **technology for which there was no need** leading to abandonment. It was a failure.

Yet that Market Research **exposed the real customer needs, doubling sales in 6 months in a zero growth market**. What a punch line!

The punch line is this is also a case study of a real success story. BDMS raised their Marketing/ Engineering Investment Ratio™ (M/E Ratio™) from 0.01 to 4, tripling market share, and climbing from #7 to #2 in 18 months.

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Market dynamics, a moving target

Voice of the Customer Future™ (VoCF)

- New product, same customers
- $0.6 million and 2 years already invested
- $1 million more and 18 months to launch
- Abandoned, Veeco had the wrong strategy

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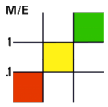

The second of our three case studies is from Veeco, an

established company (1945) with a
new product in an
established market (particulate monitors were several years old) in an
established field (the semiconductor and semiconductor capital equipment fields)

Classic investment strategy states that this should be **moderate risk**. Classic strategy says to invest in the low or moderate risk, and that less market research investment is required since the risk is low or moderate. Classic strategy was **wrong**.

Veeco prototyped a particulate detector with an advantage of being half of the competitors' manufacturing cost, assuming that semiconductor manufacturing people, faced with buying quantities of big-ticket instruments, would desire a lower price (for lower performance).

Veeco now faced an additional $1 million investment (2006 dollars), and an additional 18 months, to turn their engineering feasibility demonstrator into a finished product. Veeco needed to acquire the facts; not about what the market is now, but what the market and the competition would be in 18 months.

Customers wanted to spend more money, not less, and desired higher performance. Price was unimportant. Lower thruput was not acceptable. **Veeco had the wrong strategy!** Primary Market Research enabled Veeco to immediately save $1,000,000 and 18 months.

Logo, graphics, and other materials used with permission of Veeco.

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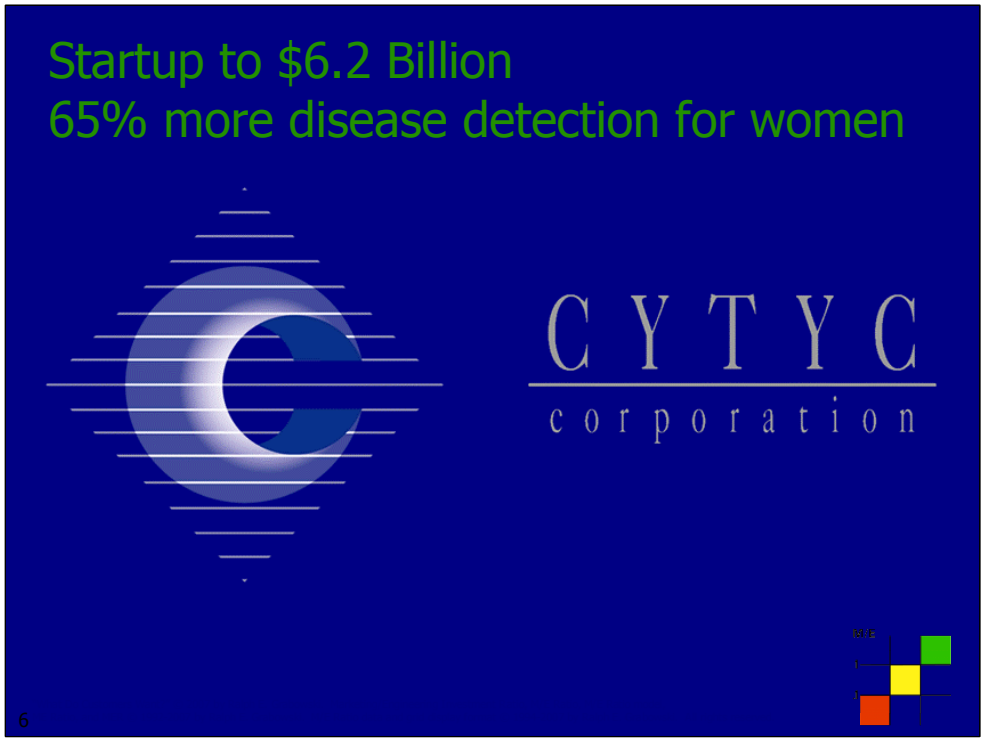

The third case study is from Cytyc, a

new company with a
new product in a
new market in a
new field (*)

Classic strategy says that this is a high risk and directs you to NOT invest in the higher risk.

Classic strategy was wrong! As these case studies show, investing in a "lower risk" instead of the "higher risk" is not the problem. The fundamental issue is to **invest in the upstream Market Research**.

The stunning results speak for themselves!
Startup to $6.2 Billion acquisition
65% more disease detection (a dramatic improvement for women's health)
a **super success!**

(*) While Pap smear screening, the reading of the microscope slide, was 50 years old, Cytyc pioneered automated Pap smear preparation, the automated creation of the microscope slide, which was a new field.

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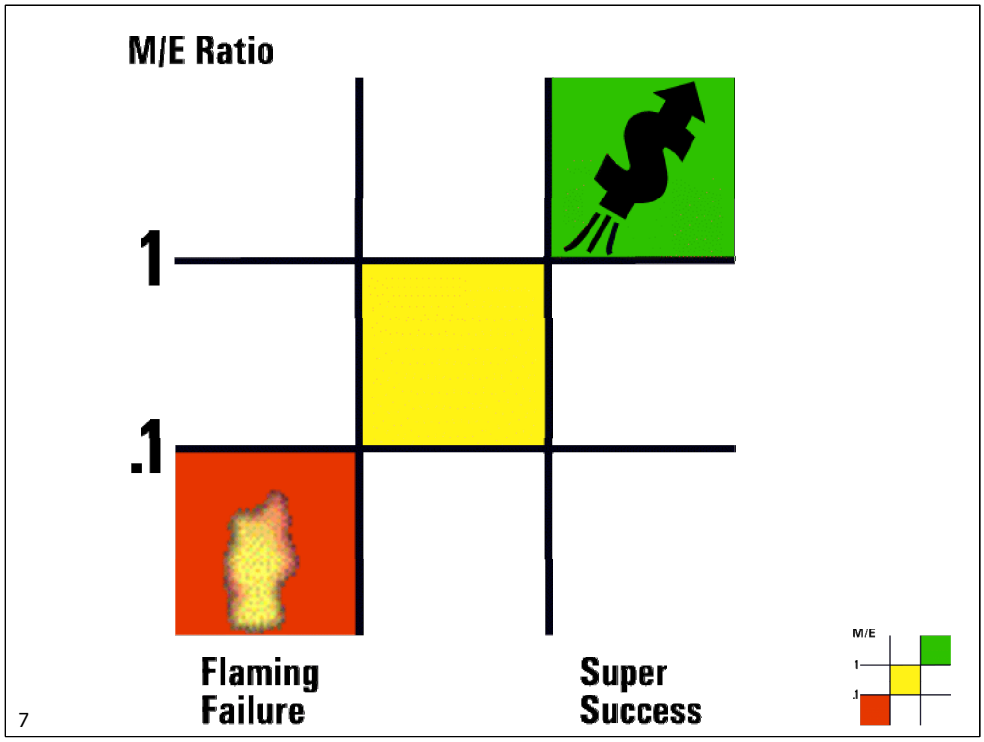

This graphic is here for a reason.

You will learns the only formula in the World's business literature to budget for Front-End Marketing, the Marketing/Engineering Investment Ratio™ (M/E Ratio™).

"Your evidence of the relationship between Market Research and success is right on!"
Michael Dell, Founder, Chairman, and CEO of Dell Computer.

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Here is the first case study that we might learn from other successes and failures, to draw a general lesson.

Consider the Marketing directed re-start of Becton Dickinson Medical Systems (BD). BD pioneered several technologies over the course of their twenty-five (25) year history …

- The first defibrillator
- The first portable defibrillator
- The first pacemaker
- The first implantable pacemaker
- The first patient monitoring system

Yet with all their technology, BD did not invest in Marketing, suffering from a Marketing/Engineering Investment Ratio™ of 0.01. Without Marketing direction, BD frittered away all their technologies and all of their businesses. BD found themselves with no growth, with losses, and reduced to seventh out of ten in the market, with a declining market share. The re-start begins with a new, Marketing oriented, management team.

Their only significant remaining business was patient monitoring systems for the Coronary Care Unit (CCU), pictured here. Note the patient in bed in the upper right; with electrodes on his chest picking up his heart ECG signal. Wires go from his chest to the bedside monitor over his head. That signal is repeated and carried in conduit in the walls to the Central Nursing Station in the foreground where nurses and a computer can monitor every heartbeat while leaving the patient resting comfortably.

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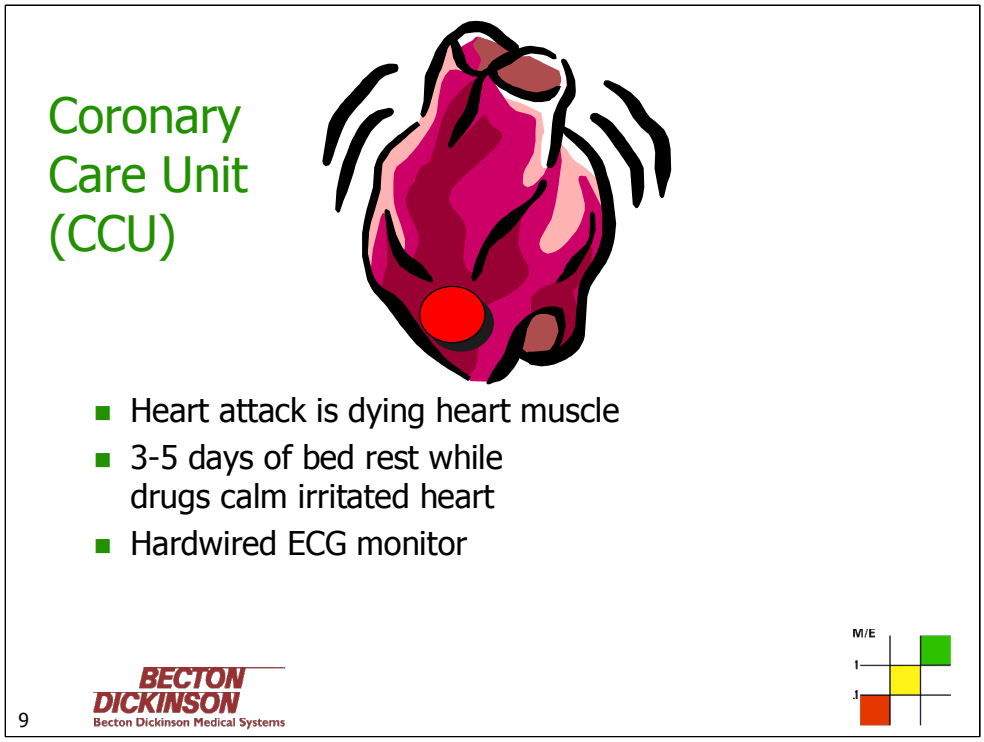

Here is a little bit of medical talk to help you understand the story.

A heart attack is an interruption in blood flow to a part of the heart muscle. Without blood flow, that portion of the heart proceeds to die. However, during the few days that it takes for that piece of the heart muscle to die, that highly irritated piece of muscle will send out electrical signals which might interrupt the heart's normal rhythm and cause the heart to stop!

The first stop in a Coronary Care Unit is 3-5 days of bed rest while a Cardiologist administers powerful drugs to calm the irritated piece of heart muscle and prevent those damaging electrical signals.

The patient is highly drugged and kept calm in bed. The patient is not moving around.

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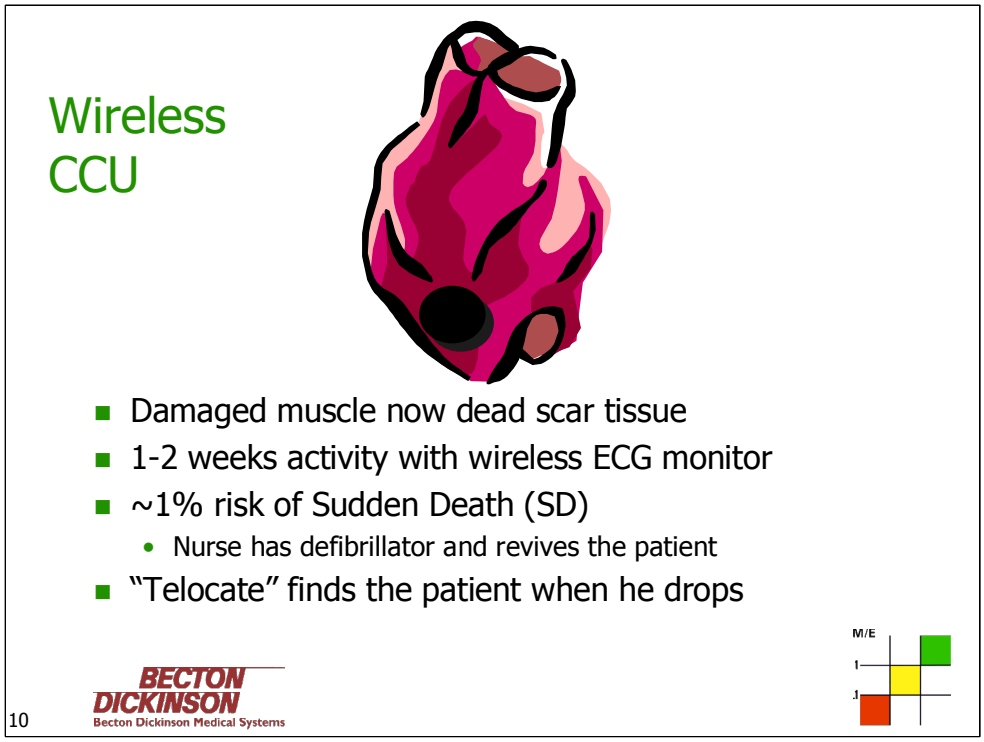

After a few days, the damaged piece of heart muscle is now dead scar tissue and will no longer send out a damaging electrical signal.

Now the problem is to get the patient moving again; to avoid a "cardiac cripple." The patient is moved into a second portion of the CCU, fitted with wireless ECG monitoring, and told to move around.

Yes, the patient will be there for another week or two and still monitored because, for that week or two, there is about a one percent chance that the heart will abruptly stop, called Sudden Death (SD). The heart stops and the patient drops to the floor. The good news is that the patient's heart is monitored, the alarms go off, and the nurse has a defibrillator to revive the patient.

BD was an established player in the wireless ECG monitoring market segment.

BD invested $1 million (2006 dollars) and 5 years of development to create a revolutionary new feature, "Telocate," which would tell the nurse WHERE the patient dropped. After all, if the nurse cannot find the roaming patient for a few minutes for a prompt defibrillation and revival, the patient will be brain dead or permanently dead.

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The patient carries a wireless transmitter in his pocket, with wires to ECG electrodes on his chest. The ECG wires are also his antenna. You can see the receiving antenna on the desktop monitoring station. In the basic wireless system, if the patient drops with Sudden Death (SD), the alarms go off and the nurse finds the patient and defibrillates him.

Becton Dickinson Medical Systems invested $1 million (2006 dollars) in engineering over five years, developing new patient location technology for the Coronary Care Unit. BD had received five US Patents, with fifteen more pending.

Telocate adds a mimic panel with a map of the hospital. When the patient alarms, Telocate tells the nurse **where** the patient dropped.

Shortly after I joined BDMS, I was told that Telocate's 5-year development process was finished and that the new product was ready for production, "Now you can begin the Marketing, Ralph."

I asked everyone I could find, "What Market Research had been done in support of Telocate?" Half the people responded, "None." The other half answered, "What's Market Research?"

Succeeding is business can be considered as a process of checking off all the boxes. If you skip a box and do not check them all off "in order," then you still need to check off that box eventually. BD had to go back and check off that box.

Market Research had not been done. Somehow, I kept a straight face. Ok, now let's see what Market Research is and learn how to do it.

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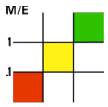
What is Marketing?

- Market Research
  - Neither promoting nor selling
- Leadership
- Up front, early intervention
- Fact gathering, analytical
- Understand the customer & the market
  - Competition, payback, food chain …



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First, some definitions.

Marketing is differentiated from promoting and selling in function, as well as by time.

Marketing is the **upstream process** that occurs before the product is ready; perhaps even before the product is committed to engineering. Marketing is an iterative process conducted as a team with technologists.

Upstream Market Research is early intervention to validate and size the business opportunity, to guide engineering to develop products that deliver benefits that customers are willing to spend money to receive, and to steer the enterprise.

Market Research is a simple name for a complex series of fact gathering, analytical processes including market segmentation, market sizing, market validation, Competitive Intelligence (CI), food chain analysis, modeling the customer, calculating customer payback, and quantifying customer needs.

Marketing is not selling.

Marketing is not promoting.

Marketing is leadership.

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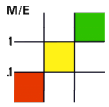
Marketing defined

- Guiding Engineering to design products and services that deliver benefits, and ONLY those benefits, which customers are willing to spend money to receive
- Achieving financial and strategic goals
  - Creating financial and strategic goals
- Leadership – steering the enterprise



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Marketing is defined narrowly!

Marketing steers Engineering to design products and services that deliver benefits, and ONLY those benefits, which customers are willing to spend money to receive.

Marketing is the upstream process that occurs before the product is ready; perhaps even before the product is committed to engineering. Marketing is an iterative process conducted as a team with technologists.

Upstream Market Research is **early intervention** to validate and size the business opportunity, to guide engineering. and to steer the enterprise. **Marketing is leadership**.

Market Research is a simple name for a complex series of fact gathering, analytical processes including market segmentation, market sizing, market validation, Competitive Intelligence (CI), food chain analysis, modeling the customer, calculating customer payback, and quantifying customer needs.

Marketing achieves company financial and strategic goals, and participates in the process of setting those financial and strategic goals.

Marketing is not selling.

Marketing is not promoting.

Marketing steers promoting and selling. Marketing steers the enterprise.

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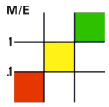
Promoting

- Informing potential customers that your product exists, delivers benefits that satisfy their needs, and that you are someone comfortable to buy from



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Marketing is differentiated from promoting and selling in function, as well as by time.

Promoting means informing potential customers (not the World) that your product exists, delivers benefits that satisfy their needs, and that you are someone comfortable to buy from.

Promoting is a **downstream process** that occurs after the product is ready.

Marketing is not promoting.
Marketing steers promoting.

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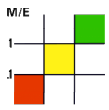
Selling

- Given what you have, compelling orders by convincing potential customers that your product or service delivers benefits that address their needs, and provides a payback to justify purchase



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Marketing is differentiated from promoting and selling in function, as well as by time.

Selling means, given what you have, compelling orders by convincing potential customers that your product or service delivers benefits that address their needs, and provides a payback to justify purchase.

This is also called "Sell What You Got" (SWYG).

Selling is a downstream process that occurs after the product is ready.

Marketing is not selling.
Marketing steers selling.

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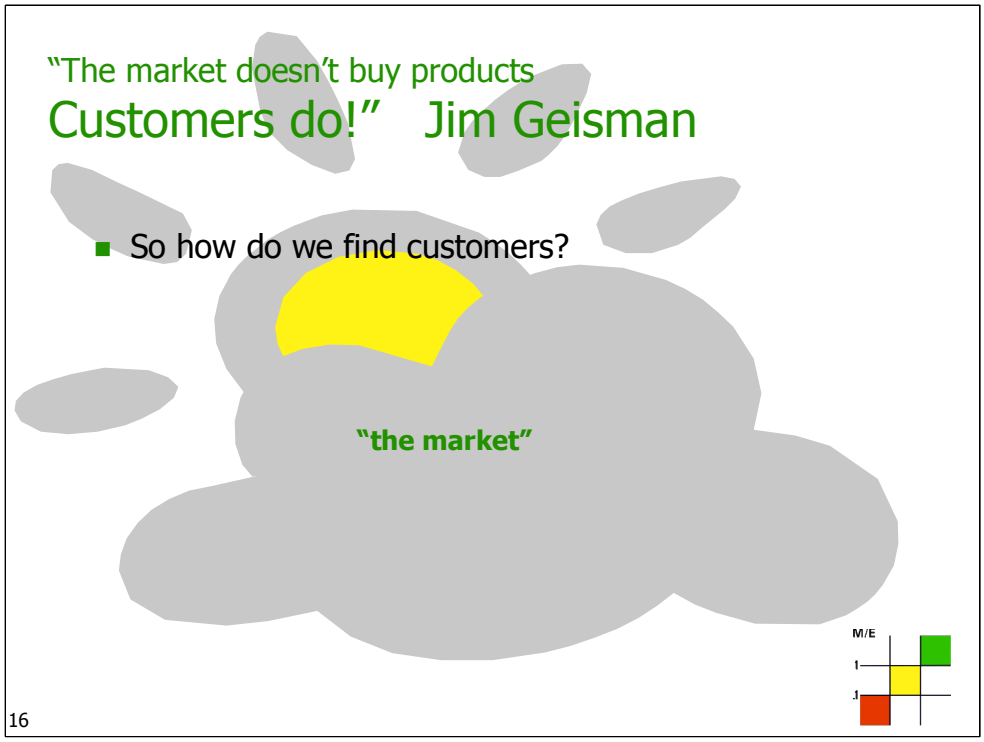

So how do we perform Market Research? How do we find the market?

"We know the customers. We know the market," I am often told. "The market will buy …"

Well, guess what, "Markets don't buy products, customers do." Jim Geisman

So how do we find customers?

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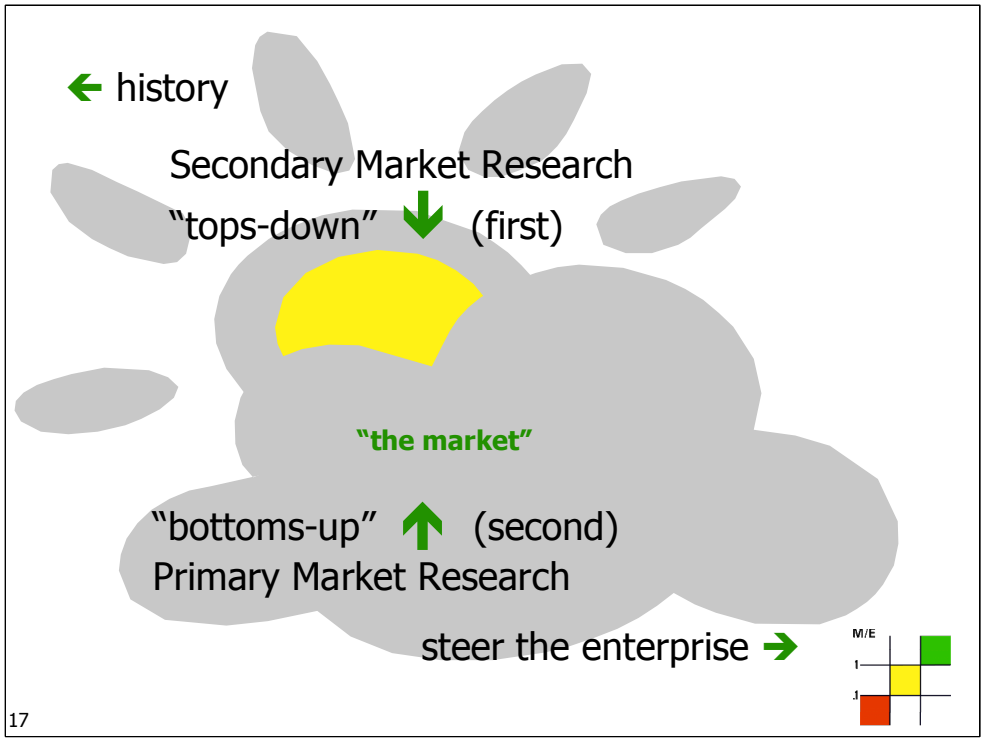

In spice of its name, Secondary market research is first.

Secondary market research is the assembly of information or data that others have gathered already. This is **tops-down** because it is usually aggregated.

It includes library scholarship, searching the web, reading annual reports, and the purchase of packaged secondary research reports from others such as Frost & Sullivan. Secondary market research is inexpensive, relative to primary market research, and forms the basis for further work. While secondary market research is excellent history, it usually does not tell YOUR company, with YOUR strengths and weaknesses, with YOUR resources, how YOU should proceed.

In spice of its name, Primary market research is second.

Primary market research is the direct gathering of new information, normally from the **bottom-up, one customer at a time.**

It includes customer surveys, customer visits, customer questionnaires, and other direct interaction. Primary market research is future-oriented intelligence and steers the enterprise.

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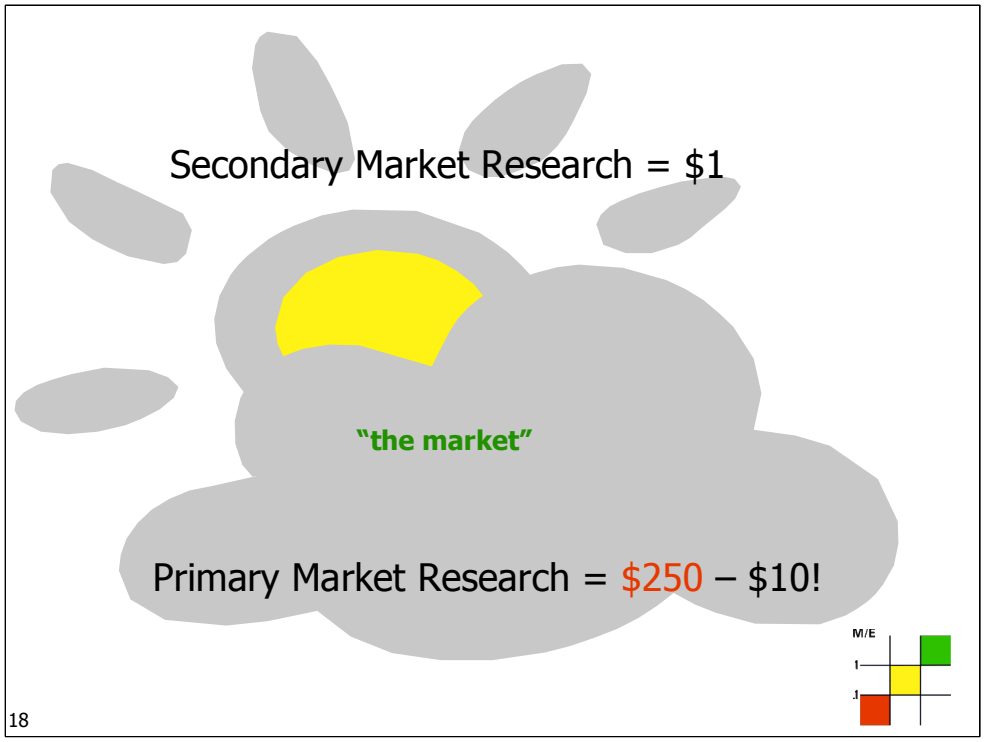

Many companies fail because they stop after doing secondary market research.

Primary Market Research demands significant resources. Budget twenty to **<u>one hundred times as much for primary market research</u>** as for secondary market research.

That's why you look for someone skilled in Primary Market Research.

Many ask me, "We just bought a Frost & Sullivan report for $10,000. Do you really mean that we have to now spend $500,000 on Primary Market Research, or fifty times as much?" Yes, I do – or perhaps even $1,000,000 or one hundred times as much! It simply takes that much effort.

My own experience is that Primary Market Research can take as much as two-hundred fifty times as much an investment as the Secondary Market Research.

Even the very best secondary market researchers, who can skillfully extract a lot of information. tell me that Primary Market Research takes at least ten times as much an investment as the Secondary Market Research. John Lescher, Vivamus Concepts

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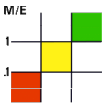
Feature electrical specs – WRONG!

Feature	BD	vs.	HP
Resolution	10 bits	← 10	8 bits
Battery life	30 day	← 30	1 day
Range	2 miles	← 10^2	100 ft.
RF power	20 ì W	← 10^3	20 mW
Efficiency	40 db	← 10^4	0 db
Market share	#7		#1

Wrong – neither in customer language nor benefits delivered

19 BECTON DICKINSON Becton Dickinson Medical Systems



What happened? What is wrong with this picture?

Here is how BD had been selling; by comparing electrical specifications (specs) with the competition, principally Hewlett Packard (HP).

Here, for example, are some of the specs of the basic wireless unit (not counting Telocate).

- HP's unit had a one-day battery life while BD's Unit had a one-month battery life. BD enjoyed a factor of thirty (30) times superiority.
- HP's unit had an antenna range of 100 feet while BD's Unit had two miles (10,000 feet). BD enjoyed a factor of one-hundred (100) times superiority or two orders of magnitude.

Everywhere BD looked, their wireless unit enjoyed **one to four orders-of-magnitude superiority** over HP. However, there were **four things wrong** with this engineering-directed and sales-directed picture:

1. This comparison is not in **the customer's language**

2. If BD's wireless unit already had such incredible product superiority, what were they thinking about to launch a new feature, Telocate?

3. BD was spending 70% more in the sum of Marketing, promoting, and selling as HP was spending, yet

4. BD was #7 in market share, while HP was #1

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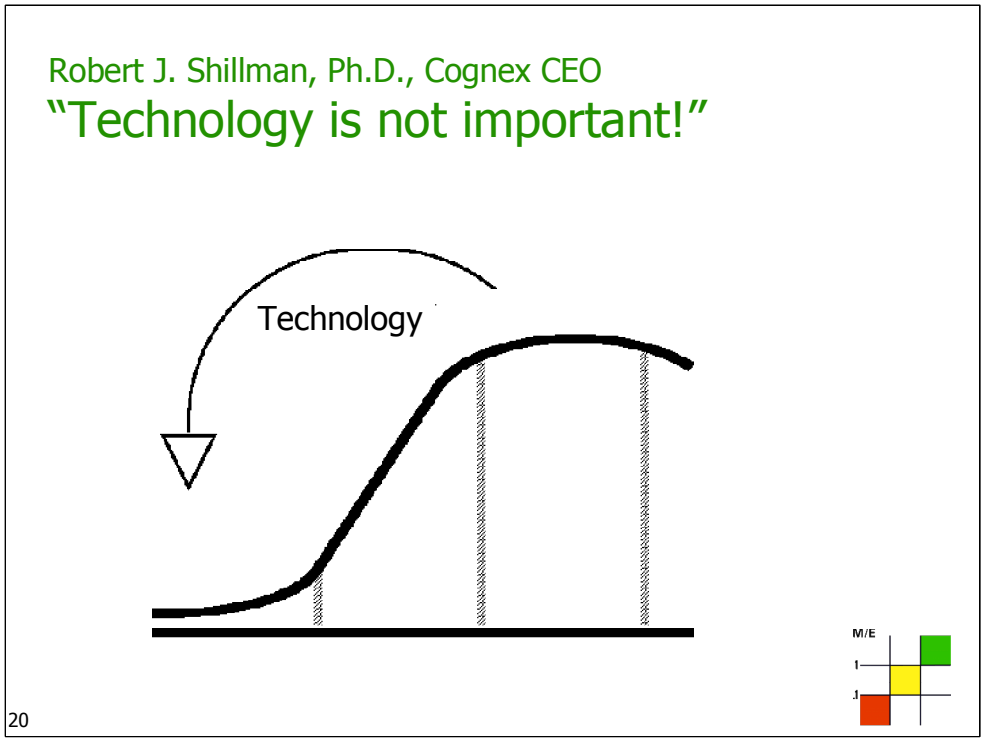

Classic (established company) business strategy dictates developing new products (new technology) to replace mature (M) or aging (A) ones, delivering significant growth (G) after an embryonic (E) phase. However, classic business strategy neither tells us **which** new products customers want to buy, nor give us a clue as to which new products are solutions for which there is no need. Some companies practice the "wet cotton ball" theory of new product development; throwing many new products at customers to see which ones might sell, much as throwing many wet cotton balls at a wall to see which ones might stick.

"**Technology is not important**, although you must have technology! The only important requirement is, 'Are there customers for what it is that you are going to make?' Who is going to buy the darn thing?" Robert J. Shillman, Ph.D., Founder, President, CEO, and Chairman of Cognex in Natick, MA in his keynote speech launching MIT's annual entrepreneurship course, "Starting And Running A High Tech Company." (MIT: January 20, 1998)

"The **excessively high rate of failure of new products** ... is because there is insufficient demand for them." Albert D. Ehrenfried, Founder, Chairman, and CEO of Metritape (retired)

Let me suggest that we use Market Research to find out if customers will buy a proposed new product **before committing engineering** investment (or very early in the process). Then we can guide engineers to develop only products that customers want to buy, and not squander any capital developing products for which there is no need.

"Many startups practice, 'Ready, Fire, Aim!' Startups rarely get a chance to re-aim once. They never get a change to re-aim twice. A lot more work needs to be done in Market Research first. Early Market Research provides direction, enabling startups to 'Ready, AIM - AIM - AIM - AIM - AIM, Fire." Eric R. Giler, Founder and President of Brooktrout Technology in his Keynote Speech, "The Telecommunications Industry: Visions, Directions, and Opportunities," MIT Enterprise Forum, February 10, 1999.

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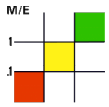
Marketing creates strategy

- "Strategy must be based on facts, not on wishes.
- "Market Research, understanding a company's place in its market, is the fundamental intellectual discipline underlying the creation of effective business strategy."

Dr. Barry Unger



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"Strategy must be based on facts, not on wishes. Market Research is the fundamental intellectual discipline underlying the creation of effective business strategy."
Dr. Barry Unger, co-Founder of the MIT Enterprise Forum and author of the SBIR act of 1982
From Grabowski, "The Board's Fiduciary Responsibility To Market Research"
The Corporate Board, (May/June 1998, Vol. XIX No. 110) 22-27.

"Market risk is the most deadly. Technical risk is the least worrisome." L. John Doerr, a partner is the Silicon Valley venture-capital firm Kleiner Perkins Caufield & Byers, as quoted by John Heilemann in "Letter From Silicon Valley - John Doerr is revolutionizing the high-tech business, for the second time" The New Yorker (August 11, 1997) 28-36

Why do some new products take off, while others don't sell at all? What is the origin of the highly visible super successes, and outright failures, that are all around us?

Market Research is the up-front process of ascertaining needs which customers are willing spend money to satisfy, thus guiding engineering to design products that sell successfully. How much shall we invest in Market Research to enable that success, and when? Engineers work out how to achieve an engineering challenge; sizing the engineering budget and staffing.

How do we size, budget, and staff the corresponding Marketing challenge?

The surprising, counterintuitive data shows that successful technology-based enterprises invest more in Market Research than in engineering. Take a look at page two of your handout.

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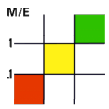
Actionable Front End™

Methods, processes, and tools

- Create a methodology
- **Quantify customer needs**
  - Rigorous Primary Market Research!
- 11 Steps to Market Research Heaven™
  - 6 P's and a D™
- Market Macrocosm™ – Who is the customer?
  - Segmenting the market, modeling, related party behavior; analyzing payback, food chain, & channels of distribution …
- Leadership
  - Steer the enterprise



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More than twenty years ago, my first client retained me to conduct some market research that would support his strategic decisions. Understanding that the choices he was approaching would affect his company quite profoundly, I asked him some questions to test his "ease of decision making." He rose up from his chair and firmly directed, "Getting the data is hard! Making decisions is easy, once I have the data. You get me that data, Ralph. I will make the decisions." I turned in the Market Research data to him a few mornings later. He made the decisions before coffee break.

Discussing and adapting strategies in the absence of data is as bankrupt a policy as the bankruptcy of the company that often follows

"Prior to entering the world of high tech, I was an English professor. One of the things I learned during this more scholarly period in my life was the importance of evidence and the necessity to document its sources. It chagrins me to have to say, therefore, that there are no documented sources of evidence anywhere in the book that follows. Although I routinely cite numerous examples, I have no studies to back them up, no corroborating witnesses, nothing." Geoffrey A. Moore, "Crossing the Chasm" (HarperBusiness New York 1991) Acknowledgement, page xv.

In his own Acknowledgment, Geoff Moore confesses that his book has no evidence whatsoever, contains no real facts at all, and is utterly absent the proper research process rigor that he knows should be applied. By Dr. Unger's standard that "Strategy must be based on facts" and by his own principles, Mr. Moore embarrassingly reveals that his book, his "chasm" model, his hypotheses, and his strategies are suspect; with no evidence behind them..

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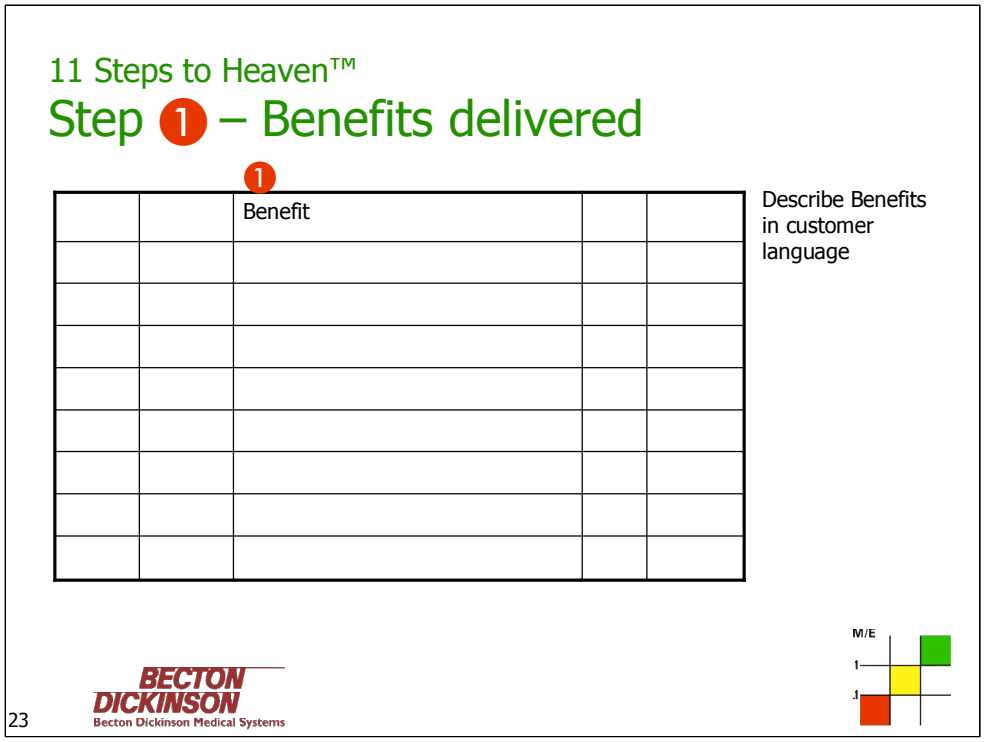

So, how do we obtain the facts, gather the data, and amass the evidence? I have named one of the first Upstream Market Research tools "The Eleven Steps To (Market Research) Heaven©." This special method quantifies customer needs.

Step one is to **describe benefits in the customer's own language**.
Some people call this customer needs and wants.

These are not electrical engineering terms! These are not technical design specs. Rather, these are the customer issues in the customer language.

For example, Becton Dickinson Medical Systems had seven nurses as its employees. Every one was an experienced, trained Coronary Care Unit Nurse. Several were the Head Nurse of their CCU. BD's Chief Nurse had seven initials after her name.

BD's Nurses collaborated with BD's Market Researchers to make sure that the customer language, the Nurse language, the medical issues, and the clinical needs were clearly laid out.

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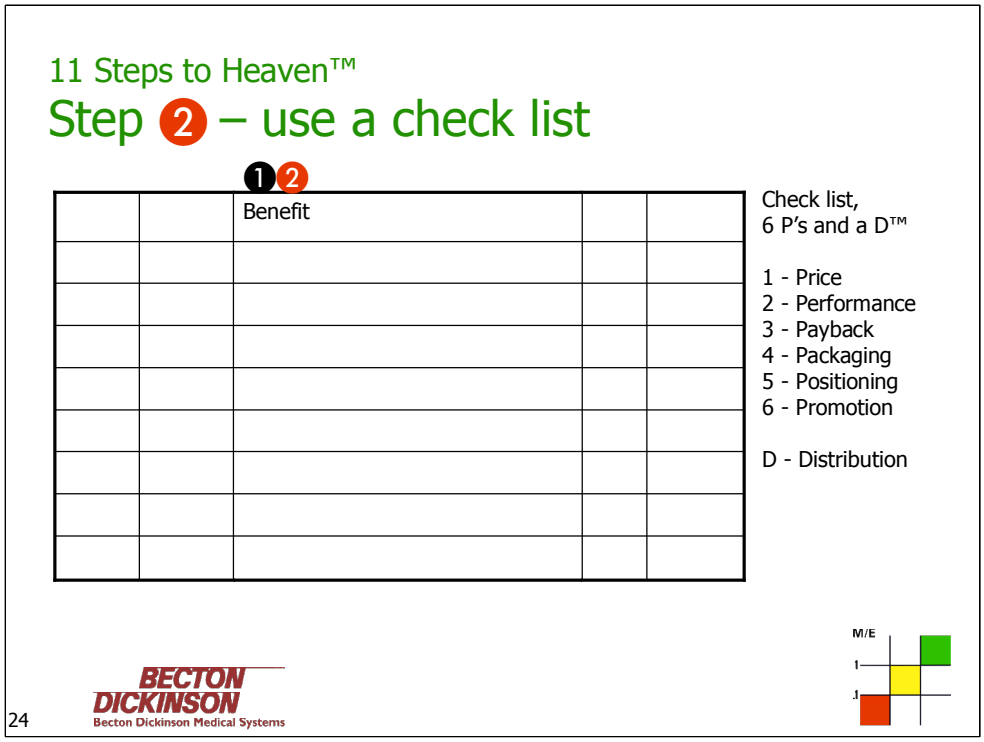

Step 2 is to make sure that you have it right. I developed a check list, **the "6 P's and a D"** ©

the 6 P's
1 - Price
2 - Performance
3 - Payback
4 - Packaging
5 - Positioning
6 - Promotion

and a D
D – Distribution

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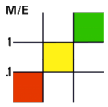
11 Steps to Heaven™

Step 3 – Rank and Weight Benefits

Rank (3)	Weight	Benefit (1 2)		
1	Highest			
2				
3				
4				
…				
…				
…				
N				

Have customers Rank and Weight the benefits they want to receive

product need (should) not be shown



25 BECTON DICKINSON Becton Dickinson Medical Systems

Step 3.

Have customers **Rank and Weight the benefits they want to receive**. Note that this is not what you think is neat or what you think would be neat. Extract the customer priorities.

The product need not, or even should not, be shown. The presence of a proposed new product or mockup can easily confuse customers. After all, you are trying to ascertain fundamental customer needs, not product reactions.

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11 Steps to Heaven™

Step 4 – customers draw the line

	❸	❶❷		
Rank	Weight	Benefit		
1	Highest			
2				
3				
4				
…				
4		- customer will NOT spend money -		
…				
…				
N				

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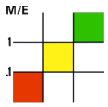

Step 4. Have customers draw the line, literally.

Above the line are benefits for which they **will spend money** to receive. Another way to put this is needs for which they will spend money to satisfy.

Below the line are benefits for which they will **not** spend money to receive. For example, "That's might be nice to have, but I would not spend money for it."

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11 Steps to Heaven™

Step 5 – examine your product

	③	①②	⑤	
Rank	Weight	Benefit	You	
1	Highest		✓	
2			✓	
3			✓	
4			✓	
…			✓	
④		- customer will NOT spend money -		
…			✓	
…			No	
N			No	

Against the list which was ranked & weighted by customers

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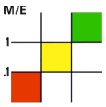

Step 5.

Examine your proposed new product (or existing product) against the **customer's ranked, weighted list**.

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Step 6 – examine Brand X (alternatives)

❸ Rank	Weight	❶❷ Benefit	❺ You	❻ Brand X
1	Highest		✓	No
2			✓	No
3			✓	✓
4			✓	✓
…			✓	✓
❹		- customer will NOT spend money -		
…			✓	No
…			No	No
N			No	✓

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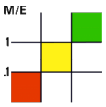

Step 6.

Examine the competition (Brand X) against the **customer's ranked, weighted list**.

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11 Steps to Heaven™

Step 7 – look for an advantage

3 Rank	Weight	1 2 Benefit	5 You	6 Brand X
1	Highest	7	✓	No
2			✓	No
3			✓	✓
4			✓	✓
…			✓	✓
4	- customer will NOT spend money -			
…			✓	No
…			No	No
N			No	✓

Advantage!

Unfair, defensible (with patents), and decisive competitive advantage

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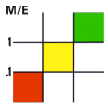

Step 7, look for an advantage against the **customer's ranked, weighted list**.

Look for an unfair, defensible, and decisive competitive advantage

unfair - you have it, and the competition does not
defensible - protected, as with patents
decisive - compels purchase decisions

What you hope to find is a customer need where you can deliver the benefit, the competition does not have it (unfair), where the competition cannot get it because you have patent protection (defensible), and where this is a #1 or #2 ranked need meaning that the customer will make purchase decisions (decisive) because of it.

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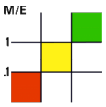
Step 8 – steer engineering

❸ Rank	Weight	❶❷ Benefit	❺ You	❻ Brand X
1	Highest	❼	✓	No
2		❽ Engineering list #1 Engineering priorities	✓	No
3			✓	✓
4			✓	✓
…			✓	✓
❹		- customer will NOT spend money -		
…		Engineering list #2 NO investment	NO engineering investment	
…				
N				

Advantage!
Steer engineering with the Two-List Method™



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Step 8, steer Engineering with the
customer's ranked, weighted list.

Delivering the #1 customer benefit becomes Engineering's #1 priority.
Delivering the #2 customer benefit becomes Engineering's #2 priority.
The least Engineering effort is to deliver the customer benefit just above the line.
There is no engineering effort to deliver benefits below the line at which customers will not spend money.

Marketing steers the enterprise.

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11 Steps to Heaven™

Step 9 – steer supporting

3 Rank	Weight	1 2 Benefit	5 You	6 Brand X
1	Highest	7	✓	No
2		8 9	✓	No
3			✓	✓
4			✓	✓
…			✓	✓
4	- customer will NOT spend money -			
…			✓	No
…			No	No
N			No	✓

Advantage!
Steer engineering
Steer supporting

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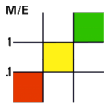

Step 9, steer support with the **customer's ranked, weighted list**. For example, Customer Training, Customer Service, Customer Support, Field Service, and Applications Engineering.

At Becton Dickinson, there were seven CCU Nurses on staff, in the home office and in the field, who trained and supported BD's Nurse customers and Cardiologist customers in their hospital Coronary Care Unit. BD also had a Field Service organization, both in the home office and in the field, to install and maintain the gear.

Supporting the #1 customer benefit becomes the #1 support priority.
Supporting the #2 customer benefit becomes the #2 support priority.
The least support effort is for customer benefits just above the line.
There is no support for benefits below the line at which customers will not spend money.

Marketing steers the enterprise.

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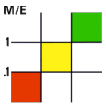
11 Steps to Heaven™

Step ⑩ – steer promoting

③ Rank	Weight	①② Benefit	⑤ You	⑥ Brand X
1	Highest	⑦	✓	No
2		⑧	✓	No
3		⑨	✓	✓
4		⑩	✓	✓
...			✓	✓
④		- customer will NOT spend money -		
...			✓	No
...			No	No
N			No	✓

Advantage!
Steer engineering
Steer supporting
Steer promoting



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Step 10, steer promoting with the **customer's ranked, weighted list**.
Literature, advertising, trade shows, press releases

Promoting the #1 customer benefit becomes the #1 priority.
Promoting the #2 customer benefit becomes the #2 priority.
The least promotion is about the customer benefits just above the line.
There is no promotion about benefits below the line at which customers will not spend money.

The first words, phrases, clauses, paragraphs, graphics, and pictures in the literature are about the #1 benefit that the customer wants to spend money to receive.

The second words, phrases, clauses, paragraphs, graphics, and pictures in the literature are about the #2 benefit that the customer wants to spend money to receive.

The literature homes in on our unfair, defensible, and decisive competitive advantage

There are neither words, nor phrases, nor clauses, nor graphics, nor pictures in the literature about the benefits that the customer does not want to spend money to receive.

Marketing steers the enterprise.

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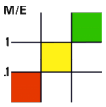
11 Steps to Heaven™

Step 11 – steer selling

3 Rank	Weight	1 2 Benefit	5 You	6 Brand X
1	Highest	7	✓	No
2		8	✓	No
3		9	✓	✓
4		10	✓	✓
...		11	✓	✓
4	- customer will NOT spend money -			
...			✓	No
...			No	No
N			No	✓

Advantage!
Steer engineering
Steer supporting
Steer promoting
Steer selling



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Step 11, steer selling with the **customer's ranked, weighted list**.

Selling the #1 customer benefit becomes the #1 priority of the sales person.
Selling the #2 customer benefit becomes the #2 priority of the sales person.
The least selling is about the customer benefits just above the line.
There is no selling about benefits below the line at which customers will not spend money.

The first words, phrases, clauses, and paragraphs out of the sales person's mouth are about the #1 benefit that the customer wants to spend money to receive.

The second words, phrases, clauses, and paragraphs out of the sales person's mouth are about the #2 benefit that the customer wants to spend money to receive.

The sales person homes in on our unfair, defensible, and decisive competitive advantage

There are neither words, nor phrases, nor clauses, nor paragraphs out of the sales person's mouth about the benefits that the customer does not want to spend money to receive.

Marketing steers the enterprise.

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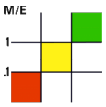
Wishes …

Unfair, defensible, & decisive advantage?

Rank	Weight	Benefit	BD	Brand X
1	Highest	(Alarm!) Locate the patient	✓	No
2				
3				
4				
…				
- customer will NOT spend money -				
…				
…				
N				



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Becton Dickinson Medical Systems

Here is what Becton Dickinson wished for:

BD will have the #1 benefit and Brand X does not!

It is unfair – you have it and Brand X does not.
It is defensible – you have patent protection preventing Brand X from making it.

And it is decisive,
meaning that the customer will DECIDE to buy from you since this is the #1 need

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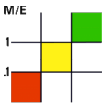
11 Steps to Heaven™

Steps 1 thru 8 – factual BD data

Rank	Weight	Benefit	BD	Brand X
1	9.2	Button starts ECG recorder		
2	8.6	Waterproof		
3	7.5	Low battery warning		
4	7.1	Bad electrode warning		
5	6.8	Patient can call the nurse		
- customer will NOT spend money -				
6	6.0	(Alarm!) Locate the patient	✓	No
7	5.7	Nurse can call the patient		
8	5.6	2 electrodes (not 3)		

Benefits in customer language

(product was not shown)



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Becton Dickinson Medical Systems installed a new management team in who began investing heavily in Marketing, raising their M/E Ratio™ from 0.01 to 4. **BD recruited staff who possessed distinct upstream Marketing skills, tools, and experience**; and who proceeded to rigorously apply formal market research methods. New people were brought in for their **Marketing process knowledge, not for industry knowledge**. Clearly BD already had plenty of people with industry knowledge, but who were failing because they were without Marketing process knowledge.

Market Research quantified the customer needs in the customer language!
BD's Marketing professionals used the "11 steps to (Market Research) heaven©" method.

Part of that research has the customer draw a line. Above the line are benefits that the customer is willing to spend money to receive. Below the line are benefits that the customer will not spend money to receive.

Telocate was below the line. Customers would not spend money for Telocate. After interviewing thirty-nine (39) Head Nurses who commanded wireless units, BD found only one nurse who once had a problem locating a patient, five years before, and for only a few seconds.

Wireless ECG in the CCU was about ten years old. BD's current telemetry model was seven years old.

While Marketing could have been performed before this project was started, BD initiated primary Market Research only after engineering was complete. That $10 K (internal labor plus external fee, 2006 dollars) market survey to understand customer needs established that BD had **developed a technology for which there was no need!** BD abandoned their million-dollar investment.

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Actionable Front End™

Armed with the facts

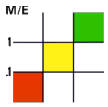
to: CEO
cc: Engineering
from: Marketing

Abandon Telocate. Facts show that this is a technology for which there is no need!

attached: factual customer data

BECTON DICKINSON
Becton Dickinson Medical Systems

36



Becton Dickinson Medical Systems installed a new management team in who began investing heavily in marketing, raising their M/E Ratio™ from 0.01 to 4.

With an understanding of the customer, Market Research drove promoting and selling. **In a zero-growth market, wireless sales doubled in six (6) months.** Before this even happened, Market Research drove manufacturing to ramp up production with an accurate forecast. Manufacturing was ready to ship as the surge in orders materialized.

By the time BD's new management team arrived, there were fifteen major projects already going on in engineering. The patient location technology, Telocate was one of the fifteen. New BD Marketing staff rigorously examined all fifteen against three questions:

1. What benefits does the customer wish to spend money to receive? Quantify them.
2. Considering only those, where might we already have, or develop in engineering; a decisive, defensible competitive advantage?
3. In which market segment(s) can we deliver the most value to the customer?

Armed with customer and market data, in six months, BD marketing abandoned or shelved fourteen out of the fifteen engineering projects as unneeded, ill conceived, or not decisive.

Marketing identified and plainly specified the technology for engineering to focus on for decisive competitive advantage. BD returned to profitability, tripled market share, and rose to #2 against HP as #1 within eighteen (18) months!

Accurate forecasts from Market Research enabled manufacturing to ship three times the dollar volume per manufacturing employee.

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FROM: Ralph Grabowski

SUBJECT: TELEMETRY TRANSMITTER/TELOCATE PLAN

The Telemetry telephone survey done by Sandy Kessler was reviewed and I make the following recommendations:

1. Abandon Telocate. This appears to be not an issue any where in the survey and even less of an issue in the particular medium sized community hospital that we service most. Additionally, hospitals don't appear to want to spend any money for this feature even if it were offered.

2. Feature the four (4) major features nurses want most that we appear to already have. The only feature they wanted that we don't have now is a water resistent container. The relative rankings on a 0-10 scale are:

9.2	A button to start recorder at CNS
8.6	A water resistent container
7.5	Battery low indicator
7.1	Faulty electrode warning
6.8	Nurse call button on transmitter

There appears to be a large gap in their ranking and you get to some features that we do not now offer:

6.0	Telocate
5.7	Nurse can call patient
5.6	Two electrodes instead of three

Therefore, I recommend we have an ad campaign and communications campaign with the salesmen to feature "the four features nurses want most from Telemetry. ...all available from Becton Dickinson". :

This is the actual memo.

Telocate was a radical technology. Telocate was a radical innovation.

However, Telocate did not disrupt anything!

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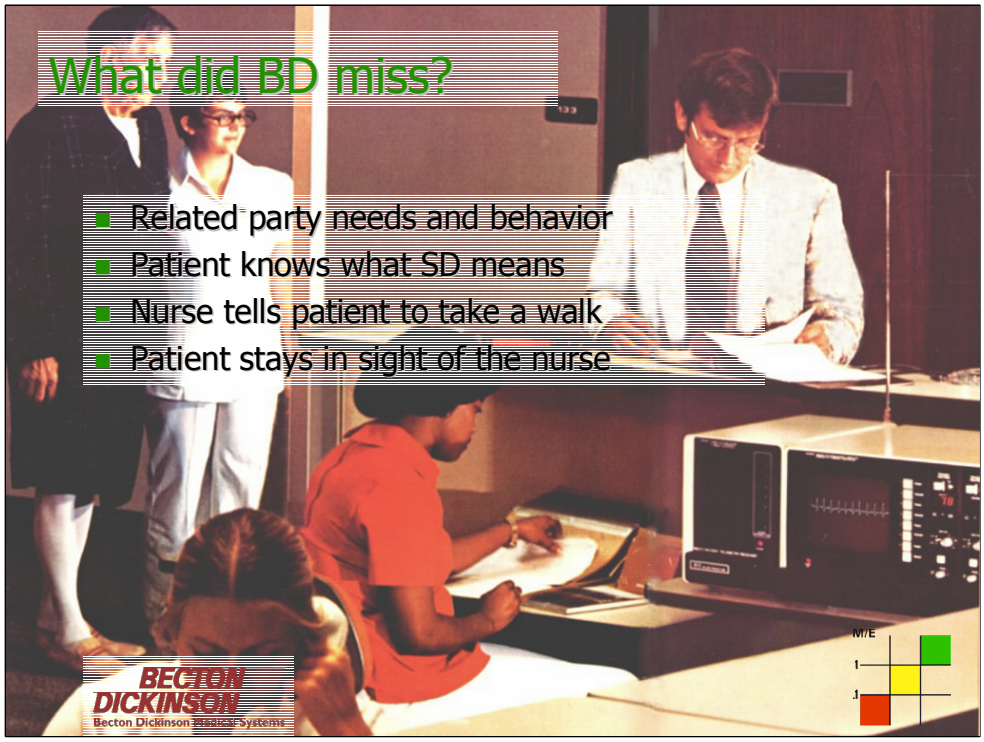

What did BD miss?

After a few days in bed the the first CCU, the patient has learned what "SD" means and has learned about the purpose of the second CCU, the wireless unit.

The patient knows that the nurse knows where the defibrillator is and that she knows how to use it to revive him when he drops. When the nurse tells the patient, "Ok, now walk around. Get out of my sight," the patient will **NOT GET OUT OF THE NURSES SIGHT**. He is still frightened. He may even grab onto her skirt to hang on for dear life!

Myth – We know the market, we know the customer.

Reality – A formal, rigorous, disciplined Market Research process is essential.

For example, BD had been in the hospital CCU ever since they helped pioneer the CCU more than twenty years before. BD's salesmen had been selling wireless gear for about ten years. Without a formal, rigorous, disciplined Market Research process, BD missed it!

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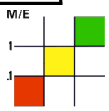
11 Steps to Heaven™

Steps 6 & 7 – BD disadvantage?

Rank	Weight	Benefit	BD	HP	GE	A/O	E4M
1	9.2	Button starts ECG recorder	✓	✓	✓	✓	✓
2	8.6	Waterproof	No	✓	✓	✓	✓
3	7.5	Low battery warning	✓	No	✓	No	No
4	7.1	Bad electrode warning	✓	✓	No	✓	No
5	6.8	Patient can call the nurse	✓	✓	No	No	No
- customer will NOT spend money -							
6	6.0	(Alarm!) Locate the patient	✓	No	No	No	No
7	5.7	Nurse can call the patient	No	No	No	No	No
8	5.6	2 electrodes (not 3)	No	✓	✓	✓	✓



39 BECTON DICKINSON Becton Dickinson Medical Systems

BD continued primary Market Research, continued to assemble facts, and gathered Competitive Intelligence (CI).

The second line of the analysis stood out. Nurses said they wanted a **waterproof case** for the wireless transmitter carried by the patient. Every competitor, except BD, had a waterproof case. BD had a case which could be readily opened to plug in new modules, such as Telocate, to add additional features.

At first, this data seemed to make no sense. Heart attack patients do not go swimming. Hospitals do not have swimming pools. BD checked with nurses about showering patients. Nurses told BD that patients shower with the wireless unit removed and dry, since the chest electrodes (similar to bandages) would come off in the water and would be changed anyway. A nurse would always stand watchfully over the showering patient so monitoring was not required in the shower.

Why did the nurses ask for a waterproof case? BD continued probing to find out that patients would sometimes drop the wireless unit in the johnny. The nurse would have to clean the unit. BD had been tricked by all the competitors who touted their waterproof cases. The customer nurses had grown accustomed to using the term "waterproof" by all the competitors' salesmen.

The real customer need was to clean the unit after it had been dropped into the toilet.

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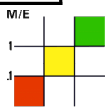
11 Steps to Heaven™

Step 9 – BD steers support

Rank	Weight	Benefit	BD	HP	GE	A/O	E4M
1	9.2	Button starts ECG recorder	✓	✓	✓	✓	✓
2	8.6	Cleanable after falling in the toilet	OK!	✓	✓	✓	✓
3	7.5	Low battery warning	✓	No	✓	No	No
4	7.1	Bad electrode warning	✓	✓	No	✓	No
5	6.8	Patient can call the nurse	✓	✓	No	No	No
		- customer will NOT spend money -					
6	6.0	(Alarm!) Locate the patient	✓	No	No	No	No
7	5.7	Nurse can call the patient	No	No	No	No	No
8	5.6	2 electrodes (not 3)	No	✓	✓	✓	✓



BECTON DICKINSON
Becton Dickinson Medical Systems

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Armed with this understanding of real customer needs, BD guided field sales and service support. Being that BD's turf was the hospital, BD had a staff of CCU nurses both in the home office and in the field. BD trained their nurses to train the customer nurses to snap open the BD wireless unit, pore saline solution over it, then hold a hair dryer in one hand with the unit in the other hand until dry.

Now, to an electrical engineer, the ideal is de-ionized water for purity, cleanliness, and non-reaction with electronics. Next is distilled water. Tap water will do in a pinch. Saline solution, used in hospitals, is slightly salty water like the human body. Saline solution is in the bag seen on the pole in TV dramas. **To a nurse, saline solution is like holy water is to the Pope!**

BD trained their sales people to counter the competitor's cry of a waterproof case by pointing out that the competition's unit, too, would still have to be cleaned after being dropped in the johnny. BD changed the basis of competition from "waterproof case" to "can be cleaned."

BD's understanding of customer needs and real-world customer situations neutralized a potential competitive disadvantage. Guided by Market Research, BD's nursing staff focused their support practices on real customer needs. The customers, also nurses, came to believe that BD understood their needs better than the competition understood their needs.

Note the grey area, below the line at which customers will spend money.
No support effort was spent below this line.

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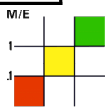
11 Steps to Heaven™

Steps ⑩ & ⑪ – steer promoting & selling

Rank	Weight	"BD delivers more key benefits"	BD	HP	GE	A/O	E4M
1	9.2	Button starts ECG recorder	✓	✓	✓	✓	✓
2	8.6	Cleanable	✓	✓	✓	✓	✓
3	7.5	Low battery warning	✓	No	✓	No	No
4	7.1	Bad electrode warning	✓	✓	No	✓	No
5	6.8	Patient can call the nurse	✓	✓	No	No	No
		- customer will NOT spend money -					
6	6.0	(Alarm!) Locate the patient	✓	No	No	No	No
7	5.7	Nurse can call the patient	No	No	No	No	No
8	5.6	2 electrodes (not 3)	No	✓	✓	✓	✓



BECTON DICKINSON
Becton Dickinson Medical Systems

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Once the cleaning issue was addressed, careful, detailed examination of the competitive landscape revealed that all the other brands had at least one "NO" in the benefits list that customers would spend money to receive.

Only BD had them all!

Incredibly, BD had a competitive advantage for six (6) years in their six-year-old wireless unit and did not realize it until, finally, formal Market Research was performed.

BD's Market Research now guided promoting and selling. **BD delivered "more key benefits that nurses want!" In a zero growth market, BD's wireless sales took of like a rocket, doubling in six (6) months.**

The salesman were told that Telocate was a technology for which there was no need; and were shown the formal Market Research results. Note the grey area, below the line at which customers will spend money. The salesmen were told that Telocate was abandoned, that no further engineering investment would be made below this line, and that no promoting or selling effort was to be spent below this line.

The sales force reacted positively to direction from Market Research. Sales per salesman more than doubled! With guidance from Market Research, the sales force used the discount tool less and sold more at full price as they became more proficient in addressing customer needs; the average discount dropped from 7% to 3%.

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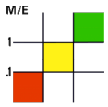
BD Marketing steers the enterprise

- Wireless sales doubled in 6 months
  - In a zero growth market
- 15 engineering projects ➔ 1
- M/E Ratio™ ↑ from 0.01 to 4
  - BD rocketed from #7 to #2 in 18 months
  - Tripled market share in 18 months
  - Sales/salesman x 2.5
  - Slashed sum of Marketing+promoting+selling $

42

BECTON DICKINSON
Becton Dickinson Medical Systems



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How do you do Market Research when the market is changing? How do you hit a moving target? The second case study, Veeco, will illustrate the tools, methods, and processes for market dynamics.

The problem

Veeco manufactures instruments such as vacuum leak detectors, and systems such as ion millers. They serve the semiconductor, disk drive, and materials processing industries. Veeco is continually developing new products as a normal strategy.

As semiconductor line widths got smaller and as particulates became under increasing scrutiny, several companies pioneered laser-based particulate detectors for semiconductor wafer processing. These $200,000-plus instruments began to prove themselves in limited areas such as semiconductor R&D, and in advanced wafer process development. Finally, the semiconductor industry appeared poised to begin propagating particulate detectors onto their manufacturing floor in volume.

---- dig deeper ---- Veeco Instruments ----

Veeco vignette http://marketingvp.com/payback/veeco/

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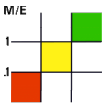
Wishes …

Half price (for half speed)

Rank	Weight	Benefit	Veeco	Brand X
1	High	Sensitivity (μ = micron) 0.3 μ	0.3 μ, 18 mo.	
2	High	Repeatability	3%	
3	Low	Thruput, 60 wafers/hr now	30 wafers/hr	
4				
5				
- customer attitude on spending money -				
!	High	Want to spend dramatically less as purchases go up significantly	Half price!	

Veeco



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Wishes …

Veeco anticipated a sudden market surge and prepared an entry. They invested $600,000 to develop a particulate detector with an advantage of being half of the competitors' manufacturing cost. Their strategy assumed that semiconductor manufacturing people, faced with buying quantities of big-ticket instruments, would desire a lower price. Veeco believed that customers would accept slightly lower performance in one area, thruput, as a tradeoff for the lower price.

Veeco now faced an additional $1 million investment (2006 dollars), and an additional 18 months, to turn their engineering feasibility demonstrator into a finished product. Other opportunities were competing for limited corporate funds. Veeco had three major engineering investments on table, but only the budget to fund two of the three. While Veeco has a marketing department, they were overloaded and could not investigate all three options.

While Veeco possessed copious (purchased) Secondary Market Research for historical background information, it was useless to predict the future. Veeco needed to acquire the facts; not about what the market is now, but **what the market and the competition would be in 18 months.**

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11 Steps to Heaven™ in 185 pages

Voice of the Customer Future™ (VoCF)

Rank	Weight	Benefit	Veeco	Brand X
1	High	Sensitivity (μ = micron) 0.3 μ now, 0.1 μ in 18 – 36 months		
2	High	Repeatability		
3	Must	Thruput, 60 wafers/hr minimum		
4	Coming	Patterned wafers		
5	Coming	Thin films		
- customer attitude on spending money -				
!	High	Will spend 3x to 5x for more sensitivity and repeatability		

Process, methods, and tools
The 11 steps™
Voice of the Customer Future™ (VoCF)
High market-place dynamics, rapid technology changes

Both because of rapid technology changes in the customer's technology as well as because of the potential for rapid technology changes in the competitors' approaches, Veeco also had to address high market-place dynamics. In order to do that, Veeco created a market survey methodology which addressed two issues:

- Where would the market (the customer technology) be in 18 months?
- Where would the competition (and their technology) be in 18 months?

Both customer needs and the competition were **quantified 18 months in the future** with the 11 steps to (Market Research) Heaven™ method. Veeco surfaced the Voice of the Customer Future™ (VoCF).

This is a picture of the 185-page 3-ring binder of data.

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11 Steps to Heaven™

Voice of the Customer Future™ (VoCF)

Rank	Weight	Benefit	Veeco	Aeronca
1	High	Sensitivity (μ = micron) 0.3 μ now, 0.1 μ in 18 – 36 months	0.3 μ, 18 mo.	0.3 μ now 0.1 μ, 18 mo.
2	High	Repeatability	3%	3%
3	Must	Thruput, 60 wafers/hr minimum	30 wafers/hr	60 wafers/hr
4	Coming	Patterned wafers	No	Coming
5	Coming	Thin films	No	Coming
- customer attitude on spending money -				
!	High	Will spend 3x to 5x for more sensitivity and repeatability	Half price	Full price

Results and payback

Customers wanted to spend **more money, not less, and desired higher performance.** Price was unimportant. Lower thruput was not acceptable. **Veeco had the wrong strategy!**

Uncovered were performance areas (sensitivity and repeatability) that customers were willing to spend more money for, and what higher price they would pay for specific improvements in those two areas.

A competitive analysis told Veeco which of their competitors (brand X) had the right technology; which one would be on target for the way customer needs were evolving.

We gathered the facts!

Myth – Now that we have finished the Market Research and have the answer, we can get back to the serious stuff, the engineering.

Reality – The market changes. Customer needs change. The competition reacts to your actions and also launches new products. Market Research is a continuous process, not a one-time event.

Reality – Even if you have the Market Research answers for this generation of your product, you will launch new products which will require their own, new Market Research.

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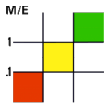
Opportunity selection

Financial and strategic results

- Abandoned their internal project
- Saved Veeco $1 million
- Sized the market – larger than expected
  - confirmed that customers already had purchase intent for more units in the next three years than they had bought cumulatively to date
- Initiated a multi-million dollar acquisition bid
  - for the competitor who had the right technology

Veeco



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Financial and strategic results

Market sizing confirmed that customers already had purchase intent for more units in the next three years than they had bought cumulatively to date. The numbers were larger than Veeco had been projecting. This gave Veeco confidence to make an additional investment.

Within 24 hours, Veeco used the Market Research results to abandon their internal project and to begin a multi-million dollar acquisition bid for the competitor, Aeronca, who did have the right technology. That move stirred the industry and Eastman Kodak outbid them, but that's another story.

Primary Market Research enabled Veeco to immediately save $1,000,000 and 18 months.

M/E Ratio™, an investment in Marketing

Veeco suffered from a Marketing/Engineering Investment Ratio™ (exclusive of promoting or selling) of 0.07 for this particulate detector project, a model of failure. While the story is of a Market Research success, the project was a financial failure in the sense that Veeco invested $600,000 and had no return on their investment.

Veeco sold considerable product into the semiconductor fab front end; the same place where their new particulate detector would be sold. Yet Veeco's marketing department had neither generated any customer names nor initiated contact with anyone whatsoever in any semiconductor fab about this potential new product!

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How do you create a disruptive technology?

How do you create a disruptive innovation?

How do you do Market Research when the market does not exist? How do you start a new field? The third case study, Cytyc, will illustrate the different tools, methods, and processes for the beginning of a new field. Clearly, you cannot get so specific as with the "11 steps to heaven™." You need more general and broader probing.

The fundamental tools of the Market Macrocosm™ (M^2) method are:

1- A broad overview of the market landscape
2- Market segmentation
3- Market sizing, from the bottom-up
4- Customer payback analysis
5- Disciplined, rigorous, Primary Market Research
6- Investing more in Market Research than in engineering

In the 50 years since the Pap smear became widely used, cervical cancer deaths have declined 70%. It is the only cancer screening test in the world that has decreased the incidence and mortality (numbers and deaths) of a cancer.

Nevertheless, the conventional Pap smear suffered from a terrible error rate.

Power Point slides, logo, graphics, and other materials used with permission of Cytyc.

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The conventional Pap smear is made by hand; the physician "smears" the sampling device across a microscope slide to spread a layer of cells. Each physician may do it differently, leading to some slides with thick lumps and clumps, and some slides with clear areas of no cells. The conventional Pap smear has False Negative rates ranging from 10-55% and up to **90% of those False Negatives are due to limitations of sampling or slide preparation.**

In order to address these problems, Cytyc Corporation has developed the ThinPrep® Pap Test®. In May 1996, the Food and Drug Administration (FDA) approved the ThinPrep® Pap Test® as a replacement for the conventional Pap smear. On November 6, 1996, the FDA approved labeling allowing Cytyc to claim that:

•The ThinPrep® 2000 System is **significantly more effective than the conventional Pap smear,** improving detection of Low Grade Squamous Intraepithelial (LSIL) and more severe lesions by 65% in screening populations and by 6% in hospital (high risk) populations.

•**Specimen quality** with the ThinPrep® 2000 System is **significantly improved over that of conventional Pap smear** preparation in a variety of patient populations.

By reducing the number of sub-optimal or "satisfactory but limited by" (SBLB) slides by as much as 50%, the number of return visits and repeat Pap smears is diminished. The significant improvement in specimen quality will substantially reduce costs and patient anxiety associated with re-screening and unnecessary follow-up testing.

Cytyc established the new standard of care. Cytyc has 17 issued patents and 11 pending patent applications in the United States (Cytyc 2001 Annual Report).

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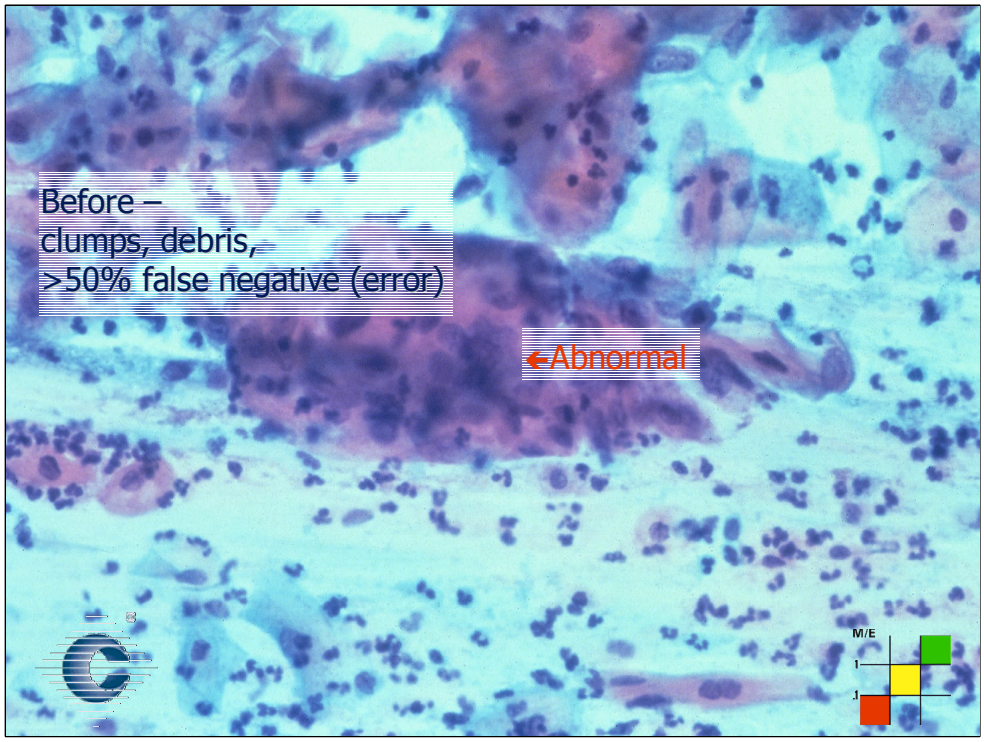

In the center of the microscope field is a mass of cells with abnormal, misshapen nuclei. This is exactly the **indicator of a precursor of cervical cancer that the Pap screening is supposed to find.**

The conventional Pap smear has False Negative (FN) rates ranging from 10-55%. A human Pap reader must view about two thousand separate fields under a microscope, examining perhaps 250,000 cells to attempt to find a few cells (as little as five or six) that have slightly misshapen nuclei.

About one-third of the 15,000 women diagnosed with cervical cancer annually still die because the cancer was detected too late.

With the conventional Pap smear method, cells can be obscured by blood, mucus, and inflammation. Furthermore, the three-dimensional (3D) character of overlapping cells in lumps and clumps makes the examination a daunting challenge.

Accurate interpretation of up to 40% of conventional Pap smears are compromised by the presence of blood, mucous, obscuring inflammation, scant cellular material, and air-drying artifact.

The National Cancer Institute (NCI) estimates that about 3.5 million Pap smears are found to be inconclusive each year in the US which often lead to unnecessary colposcopy (internal exam), biopsy, and office visits. The average cost of the standard management of such cases is about $1,200 per case. The NCI estimates the cost to the US health care system at about $3.6 billion each year.

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The first market research, while the entrepreneur was still in the basement, was about the food chain; the players and the concatenation of people, suppliers, and companies that make a market. Let's start by talking about the market segmentation, market sizing, and market access. This is the **business landscape**.

I am often told by entrepreneurs, "We have this neat (Pap smear testing) technology. EVERYBODY can use it!" What's wrong with that statement? Well, guys cannot use a Pap test! That's half of the World's population. OK, you say, "There are 5 Billion people in the World, about half of which are women; 2.5 Billion women times $40 per Pap test means a $100 Billion market. All we need is 1% market share and we will be a $1 Billion per year company overnight!" The first thing that is wrong with that statement, if it played out that way, is that a $100 Billion market will attract serious competition and the company which dominated the other 99% of the market will dominate you.

However, that is not the market segmentation – that is not the market sizing. Here is that market segmentation and sizing:

- A woman,
- who is sexually active (eliminating women under the age of 12, or about 1/3 of all women),
- who spends money on health care (that eliminates all of the World except the developed countries – and even there eliminates the first several rungs of the socioeconomic ladder where they can't spend money on health care)
- goes to the doctor (not any doctor – not the cardiologist, psychologist, podiatrist, or proctologist – but the her gynecologist or family practice physician or nurse-midwife) who takes a Pap smear

This is a channel of collection, not a channel of distribution. The Doctor, reimbursed by a 3rd party payer, sends the Pap slide to a commercial clinical lab. At the lab are cytologists; the people with specialized degrees from cytology schools who read the Pap smear slides.

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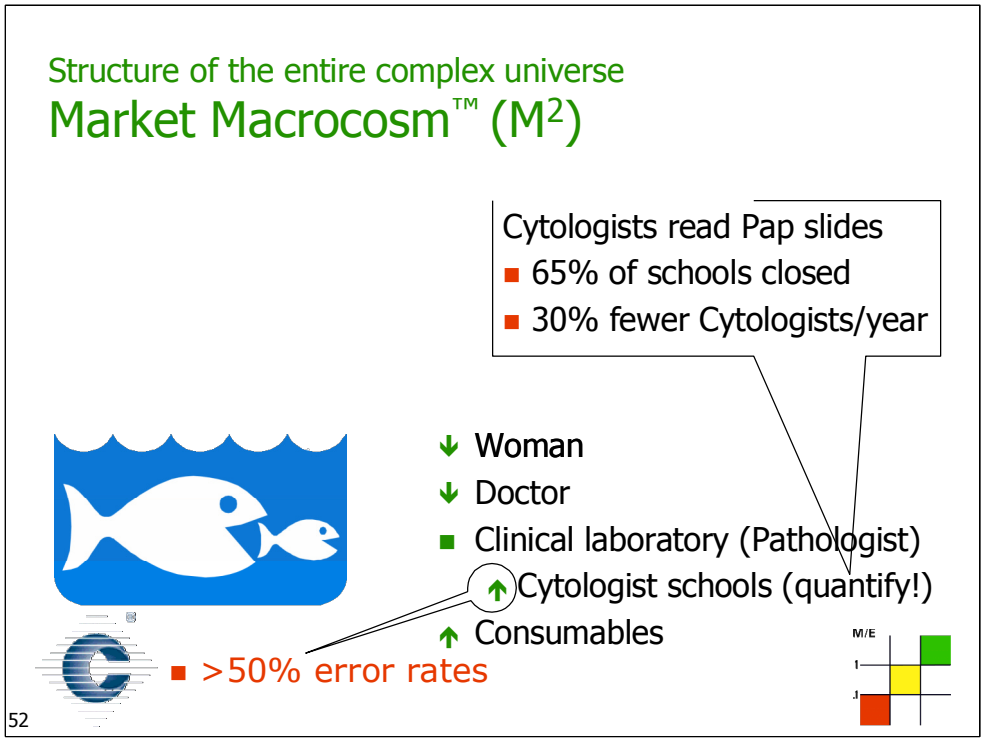

There were rumors that clinical labs were having trouble finding cytologists. Market research converts anecdotes into quantified evidence! The **fundamental driving forces were quantified** and conveyed to potential investors to compel investment.

Cytyc market research, while the entrepreneur was still in the basement, revealed that 30% fewer cytologists were being certified per year in the prior 5 years. By mid-1987, only 41 cytology schools were still active, down from 117 in the 1960s, with 76 having closed or stopped training.

Why is this important?

•Because the job is difficult, tiring, and tedious, fewer entered the field.

•Because with too few cytologists to do the work, there was pressure to review (examine) more slides per day just to get the work done, and this led to missed warnings (False Negative).

Overall is regulation. Some of the institutions include:

•FDA – Food and Drug Administration

•HCFA – Health Care Finance Agency, now called The Centers for Medicare & Medicaid Services (CMS), a Federal agency within the U.S. Department of Health and Human Services. Programs for which CMS is responsible include Medicare, Medicaid, State Children's Health Insurance Program (SCHIP), HIPAA, and CLIA.

•CPT codes – "Physicians' CURRENT PROCEDURAL TERMINOLOGY", for the payment code

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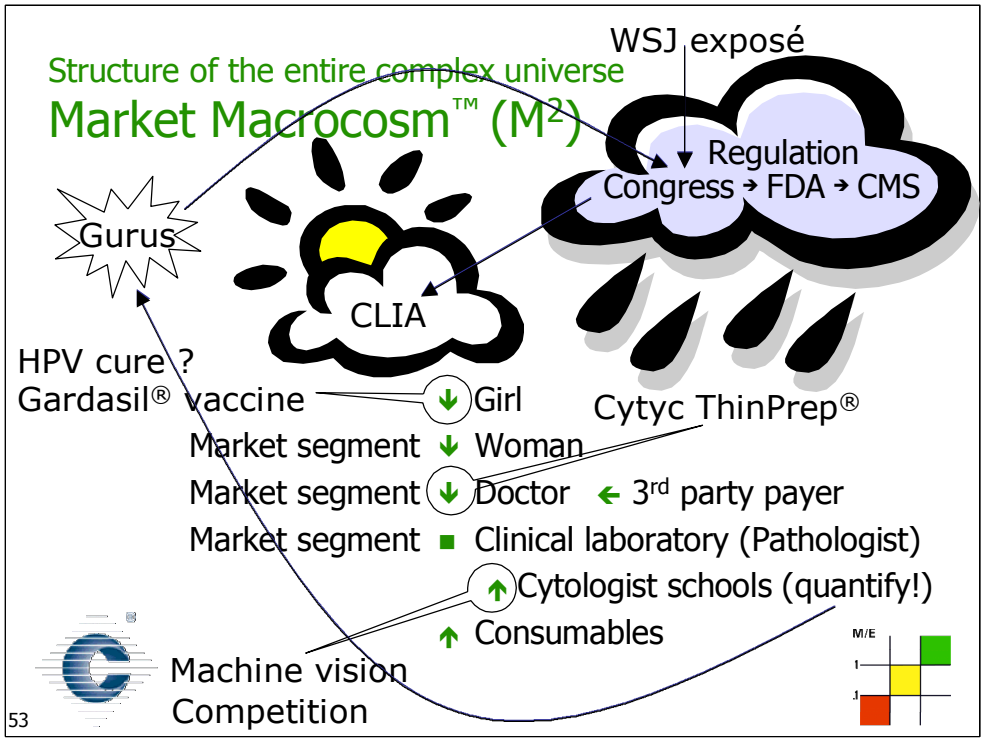

Strategy

A regulatory strategy and legal strategy should be an integral part of the business strategy. **Market research is the fundamental intellectual discipline of strategy.**

Cytyc began working to understand customer demographics, market trends, and the industry drivers; which precipitated an exposé of "Pap mills." The outcry lead to Congressional Hearings in Washington, DC, under Massachusetts' Senator Edward Kennedy. By that time, their market research was available to be used in testimony before Congress, helping to result in new legislation focusing on quality and increased disease detection (that will speed market demand for their products).

New legislation resulted, limiting the number of smears a cytotechnologist may read in a day. This ultimately sped market demand for Cytyc's products

Because of poorly run labs (Pap mills), particularly after several deaths from misdiagnosis due to inaccurate lab results, Congress wanted to guarantee public safety and the best possible patient care.

Competitive intelligence (CI)

While the entrepreneur was still in his basement, Cytyc carried out Competitive intelligence (CI) on an emerging competitor while that competitor was still in their garage. That competitor is still struggling.

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3-ring binder after 3-ring binder filled with the fact-gathering, analytical Marketing to steer the enterprise.

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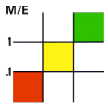
One customer at a time, "bottoms-up"

Your market, market sizing

Top customers	#1	#N	…	Purchase intent
# of machines	…	35	…	xx @price = $ of machines
# million Pap's/year	…	3	…	$ million/yr of disposables

55



OK. Time for the math quiz. Raise your hand if you know the answer.

How many customers are in the top five?

…someone will raise their hand…
That's the right answer. Five!

How many customers are in the top ten? Raise both hands if you know the answer.

…someone will raise both hands…
That's the right answer. Ten! So how many customers do you have to call?
(a little pause while the audience grasps the logic)

Earlier, we defined Primary market research is the direct gathering of new information, normally from the **bottom-up, one customer at a time**. It turns out that the 40% of America's 50 million yearly Pap tests are processed by a handful of the largest clinical labs. Cytyc asked them how many units they would need. For example, the head of one large lab stated, "I have 17 locations which would need two each. Then I would have one extra at headquarters for training and as as a spare." That is 35 units.

He also stated that his company processes 3 million Pap slides per year. Thus his 3 million Pap slides, alone, represent 15% of the Paps done by the largest labs (40% of 50 million is 20 million). Therefore, you can quickly get a sense of the **market size** (at saturation).

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Rich's rule: less than one year payback means a sure sale

$$\text{Payback} = \frac{\text{price}}{\text{savings/year}}$$

Process step	Present method	Proposed method	Savings $ x-y (loss)
1	$ x	$ y	$ +
…	$ x	$ y	$ (-)
N	$ x	$ y	$ +
	Savings per year =		Bottom line

56

Capital equipment is purchased because it makes money. One of the ways companies use to calculate how much money they will make is with the **payback method**. Payback is defined as the price divided by the savings per year. The units come out in years.

Stan Rich, co-founder of the MIT Enterprise Forum and author of "Business Plans That Win $$$," came up with a rule to tell whether you will make the sale.

Rich's Rule: Less than one year payback is a sure sale. Payback between one and two years is a probable sale. A payback of more than two years is a no-sale, except in certain highly-regulated industries like electric power where they will accept a very long payback cycle.

The customer does their job now, somehow. Every process step in the present method has a cost. Every process step in your proposed new method has a cost. If the cost of that step with the proposed new method is less than the cost with the present method, there is a savings. If the cost with your proposed new method is more, then there is a loss.

There will always be some steps with the new method which cost more. For example, training, electrical power, use of Nitrogen gas, and maintenance may be more costly with your proposed new product. However, don't worry since **the bottom line is the bottom line**.

Cytyc's potential customers, some of whom had a 15-step calculation, came up with a **payback of six weeks**. What does a payback of six weeks mean with Rich's Rule? NO! It does NOT mean, "Oh, well. We will make that sale, too." With a payback of six weeks, it means that:

- You can raise the price – and you haven't even designed the product yet!
- The economics are so compelling, that you should put together a major team, raise major financing, and attack this major opportunity! Cytyc did just that.

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VCs invest in validated business opportunities, not in technology.

"It was hard to make a **commitment to market research**, to asking the questions. Once I made the commitment, getting the answers was easy." Stan Lapidus, Cytyc's Founder.

Stan brought in a professional market researcher who conducted **rigorous, formal, primary market research**. Every answer to every question was written up in detailed interview reports. This usually means investing more than twice as much time writing interview reports as was invested in the interview process.

"Deadly accurate!" was Stan's independent appraisal of the customer interviews.

He sized the big market opportunity. However, it was the detailed, bottoms-up market sizing, one potential large customer at a time, that validated the market and compelled investment.

He modeled the customer's business, both as it exists now and as how it might work with Cytyc's proposed new product, to calculate that payback might be less than six (6) weeks!

Exact quotations from potential customers were noted and written down to present to investors. Heads of major clinical labs exclaimed, "If you develop such a machine, you will make a real breakthrough and will be sitting on a gold mine! No, it will be a platinum mine!!." "I will need 35 machines."

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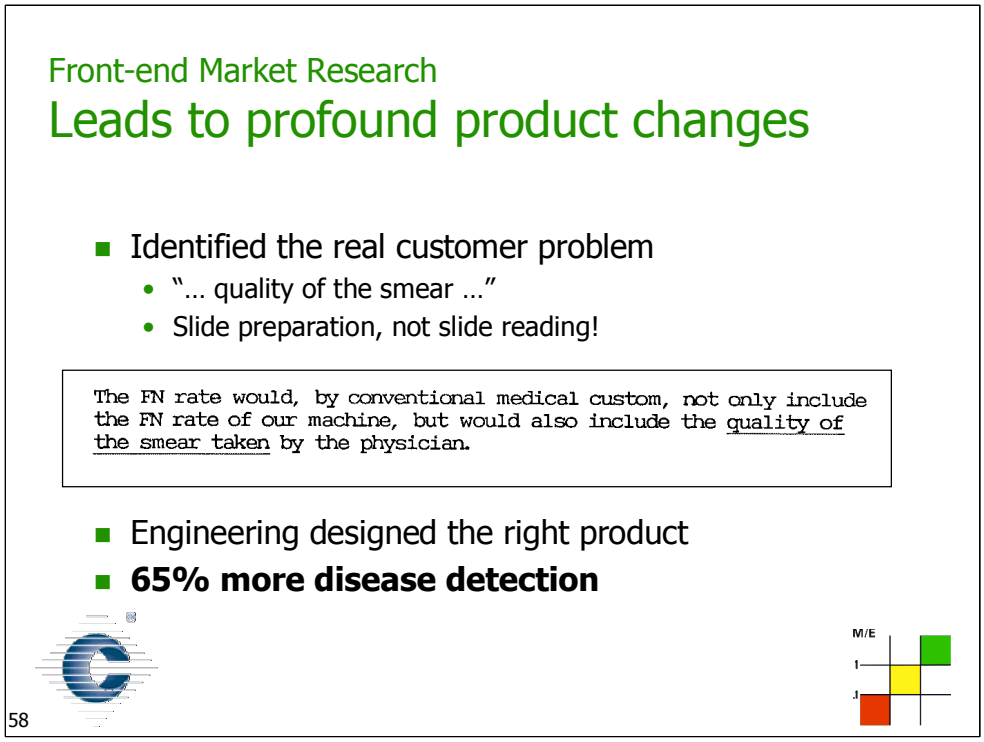

Technology-based startups present two types of technical risk. First, there is the risk that the startup cannot make the technology work. The second risk, as happened at Cytyc, is that the startup does make the technology work, but that they are **developing the wrong technology**. Up-front marketing can **guide engineering to the right technology**.

Cytyc's up-front marketing investment identified profound changes from the initial product concept, which used machine vision. An entirely new product idea arose from the primary market research; a patented slide prep system, ThinPrep™, which creates a cell monolayer and simplifies the PAP reading process.

The inset is the actual sentence from one of the very early contact reports. It was surfaced only because of the disciplined, rigorous Market Research. That work not only had every answer to every question typed up, but also the physician and lab directors' off-hand comments typed up. Just such off-hand comments kept reappearing.

---- dig deeper ---- Cytyc ----

Cytyc vignette	http://marketingvp.com/payback/cytyc/
"What Do Customers Want?"	http://marketingvp.com/papers/buhitech/
"Cytyc's Impact on Women's Health"	http://marketingvp.com/papers/mdg/
"How To Raise $100 Million"	http://marketingvp.com/papers/100mil/
"Marketing, the Bridge for Growing from Engineer to Entrepreneur"	http://marketingvp.com/guests/bridge/

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The initial product idea was machine vision; a TV camera through the microscope lens, coupled to a special computer, which would examine 250,000 cells in two minutes and subject each cell to perhaps forty separate medical criterion in software. The machine vision would pre-screen every slide (without humans) to select the few "worst" cells from each slide for presentation to a human cytologist who would perform a medical determination. The intent was to replace the (tedious, error-prone) data processing of human eyeballs with (tireless, consistent) machine data processing.

This technology was fully developed and worked. It met its specifications. Cytyc made a production run of ten units and started clinical trials.

Nevertheless, **Cytyc continued Primary market research.**

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Early market research, in advance of engineering, identified profound changes from the initial product concept. **Upstream market research identified the real customer problem;** data gathering and data preparation of the Pap smear slide, before any human data processing. A patented slide prep system emerged, the ThinPrep® System, which adds to product differentiation and simplifies Pap screening. The ThinPrep® Pap Test® makes Pap smears by an automated slide preparation unit, the ThinPrep® slide processor, that produces uniform thin-layer slides, virtually free of obscuring artifacts such as blood, mucous, and inflammation.

With marketing guidance, engineering designed the right product, and captured the business opportunity. Cytyc developed the technology to fit the customer need.

Here is how it works. As before, specimens are first collected by the clinician with a cervical sampling device. Then, instead of smearing the cells on a slide, the device is rinsed into a ThinPrep® vial containing PreservCyt® transport medium. The vial is then labeled and sent to the lab for processing.

At the laboratory, the vial is placed into the ThinPrep® slide processor. First, a gentle dispersion step breaks up blood, mucous, and non-diagnostic debris; and then thoroughly mixes the sample. A negative pressure pulse is generated which draws fluid though a TransCyt® Filter that collects a thin, even layer of diagnostic cellular material. The ThinPrep® Processor constantly monitors the rate of flow through the TransCyt® Filter during the collection process to prevent the cellular presentation from being too scant or too dense.

The cellular material is then transferred to a glass slide and fixed. ThinPrep® slides are stained and then evaluated by laboratory personnel using criteria similar to the conventional smear. What is different is the **marked improvement in clarity and specimen adequacy** achieved with the ThinPrep® System.

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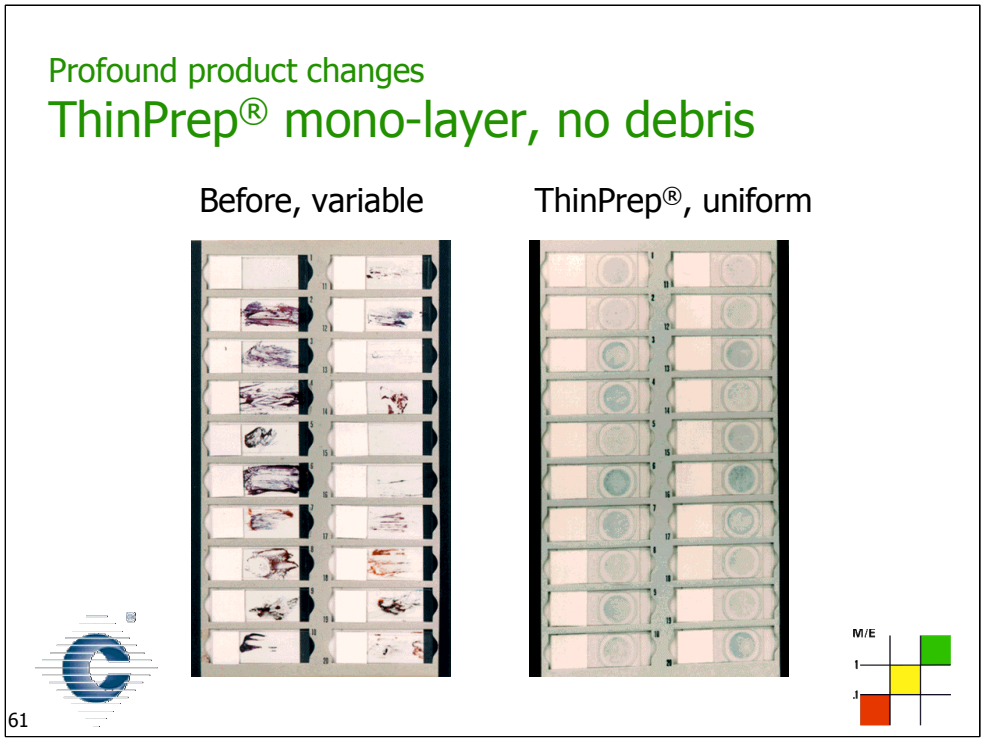

The conventional Pap smear is made by hand; the physician "smears" the sampling device across a microscope slide to spread a layer of cells. Each physician may do it differently, leading to some slides with thick lumps and clumps, and some slides with clear areas of no cells. The conventional Pap smear has False Negative rates ranging from 10-55% and up to **90% of those False Negatives are due to limitations of sampling or slide preparation.**

In order to address these problems, Cytyc Corporation has developed the ThinPrep® Pap Test®. In May 1996, the Food and Drug Administration (FDA) approved the ThinPrep® Pap Test® as a replacement for the conventional Pap smear. On November 6, 1996, the FDA approved labeling allowing Cytyc to claim that:

•The ThinPrep® 2000 System is **significantly more effective than the conventional Pap smear**, improving detection of Low Grade Squamous Intraepithelial (LSIL) and more severe lesions by 65% in screening populations and by 6% in hospital (high risk) populations.

•**Specimen quality** with the ThinPrep® 2000 System is **significantly improved over that of conventional Pap smear** preparation in a variety of patient populations.

By reducing the number of sub-optimal or "satisfactory but limited by" (SBLB) slides by as much as 50%, the number of return visits and repeat Pap smears is diminished. The significant improvement in specimen quality will substantially reduce costs and patient anxiety associated with re-screening and unnecessary follow-up testing.

Cytyc established the new standard of care. Cytyc has 17 issued patents and 11 pending patent applications in the United States (Cytyc 2001 Annual Report).

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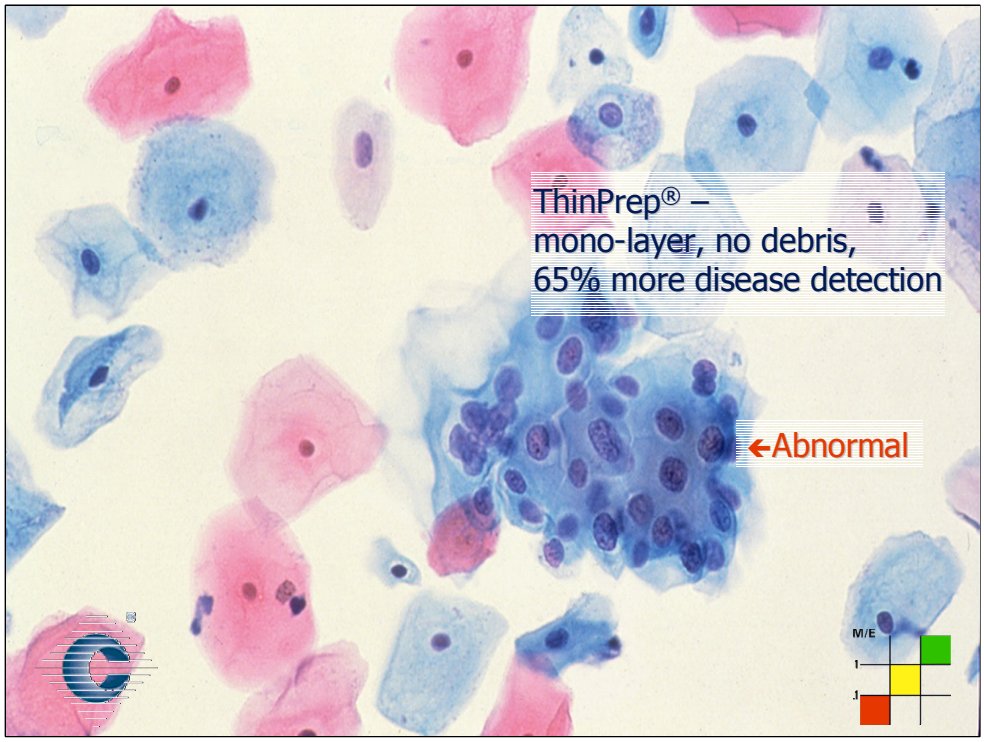

There is a mass of cells with abnormal, misshapen nuclei in the center of both this microscope view and the earlier slide. This is exactly the **indicator of a precursor of cervical cancer that the Pap screening is supposed to find.**

However, the warning cells are difficult to see in the first slide and more readily apparent here. The suspect cells in the first slide are obscured with medical debris and overlapping cells, and difficult to see because the layer is thick and hard to keep in focus under a microscope. The suspect cells in the ThinPrep® slide are more easily seen because they are free from medical debris and overlapping cells. The layer remains in focus since it is presented in a monolayer, one cell thick.

Clinical trials demonstrated that the **ThinPrep® Pap Test® increases disease detection 65%,** and reduced the error rate (False Negative) by a factor or four. Specifically, the clinical trials showed Cytyc's ThinPrep® System detected 65% more cancerous or precancerous samples when used in screening centers (where 95% of all Pap smears are processed) compared to the conventional Pap smear.

The ThinPrep® Pap Test® method preserves the cells and minimizes cell overlap, blood, mucus, and inflammation. It creates a mono-layer, a layer one cell thick, with no overlapping cells.

65% more disease detection!

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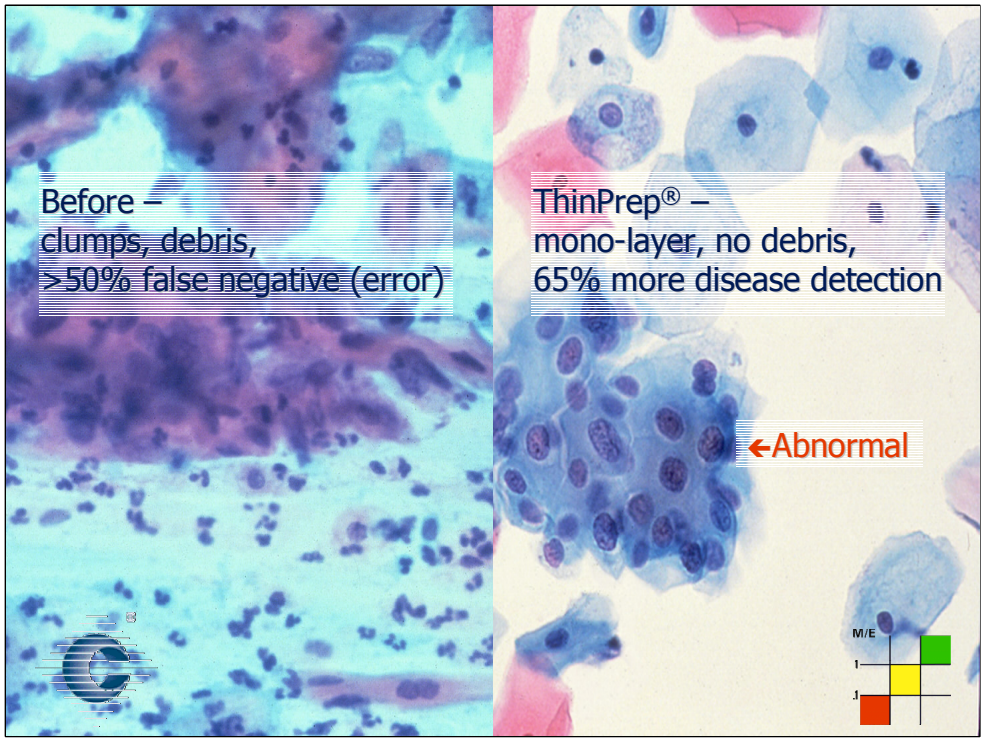

Here is the before-and-after, side-by-side.

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Cytyc's super success – $$$

- Raised $174.4 million
  - $3.6 million first round
  - $43.6 million Venture Capital
  - $48 million IPO
  - $85.8 million secondary offering
- Cytyc is being acquired for $6.2 Billion

64

Cytyc's first round VC financing, $3.6 million, was huge for the late 1980s.

Cytyc achieved a **market capitalization of $3.65 Billion**. [Peak market value on October 21, 2001 at the day's high stock price of $30.22 times 120,776,000 (diluted) shares outstanding as of Dec 31, 2001.]

In 2004, annualized revenue passed $320 Million, and Cytyc made a $311 million acquisition for cash.

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Cytyc's super success – strategic

- Rapid market penetration
  - Approaching 100% World market share
  - Nearly all insured US women covered
- Dominate the competition
  - Officially declared a (legal) monopoly
- FDA approved labeling
  - **Significantly more effective by 65%**
  - **Specimen quality significantly improved**

65

• 50% US market penetration in 13 months after product introduction, as defined by # of insured women covered.

• By 2004, Cytyc approached 100% market share, with nearly all insured US women covered.

While Stan was still in his basement, Cytyc carried out Competitive intelligence (CI) on an emerging competitor while that competitor was still in their garage. That competitor is still struggling.

In order to address these problems, Cytyc Corporation has developed the ThinPrep® Pap Test®. In May 1996, the Food and Drug Administration (FDA) approved the ThinPrep® Pap Test® as a replacement for the conventional Pap smear. On November 6, 1996, the FDA approved labeling allowing Cytyc to claim that:

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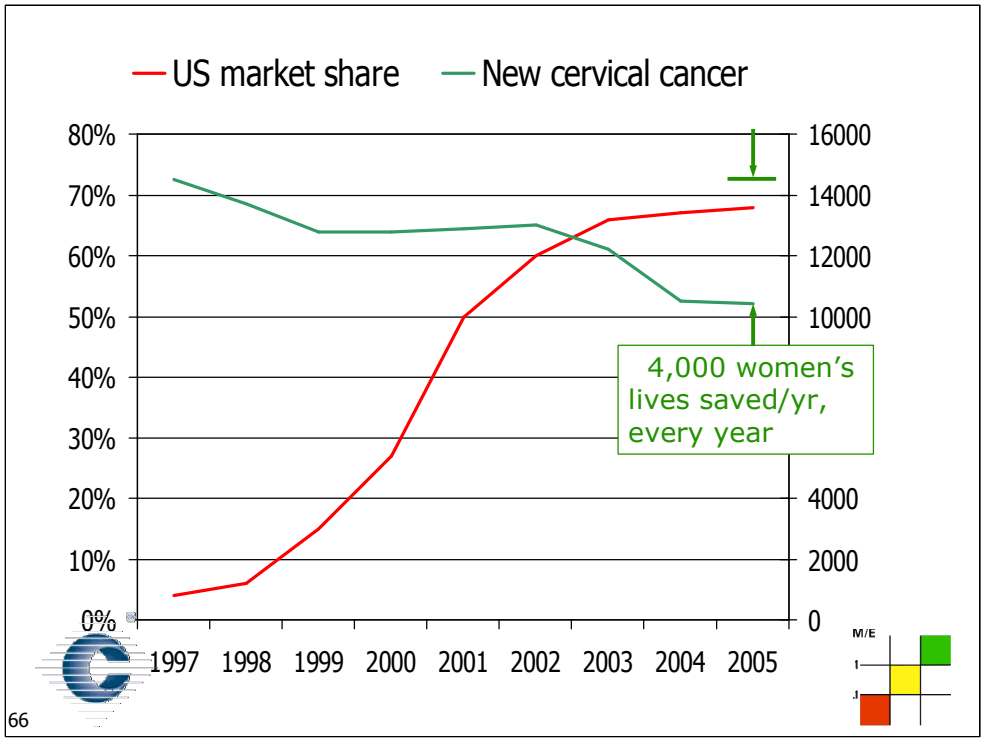

Cytyc's ThinPrep® Pap Test® is now saving more than 4,000 women's lives in the US every year.

This is a plot of Cytyc's market share versus the number of new cervical cancer (100% fatal) cases.

It was not the case that Cytyc's technology or innovation was disruptive, for they had the wrong technology and wrong innovation at first, even though the machine vision system was radical technology and radical innovation.

It was only with input from Marketing, with input from the customer, that Cytyc developed the correct technology, the correct innovation, which led to their ThinPrep™ disruptive technology and disruptive innovation.

Cytyc's disruption was precipitated by Marketing!

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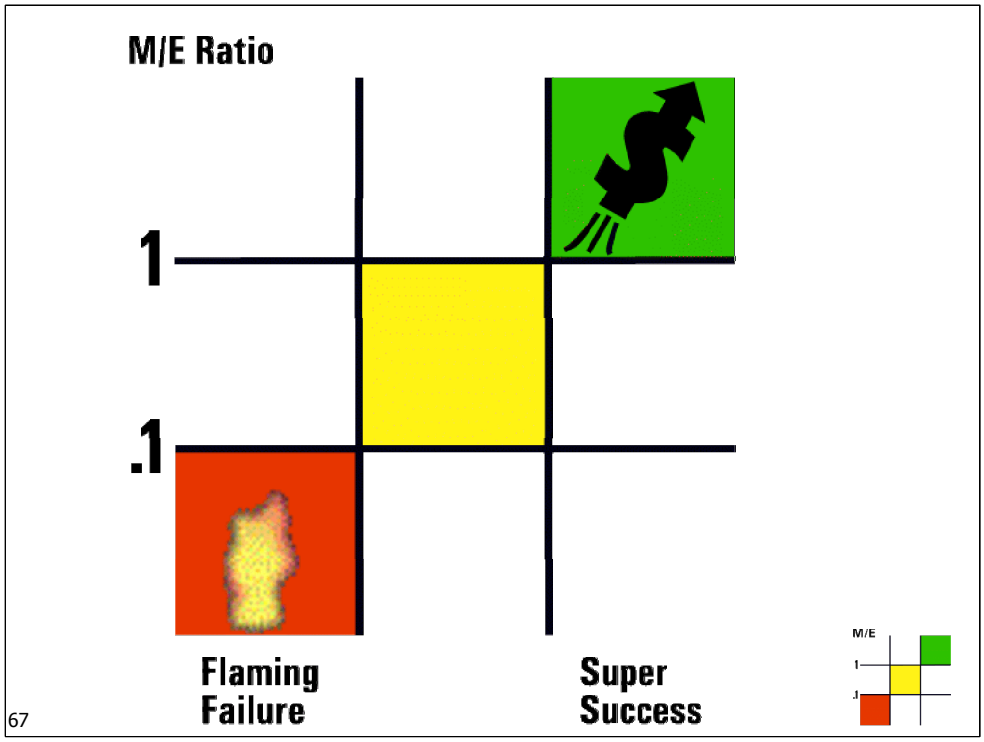

The graphic on the title slide is there for a reason. Let's take a closer look.

Across the broad landscape of technology-based enterprises are **"super successes"** like Dell Computer and Cytyc. There are also business basket cases such as Thinking Machines, Polaroid, and Genuity who have all gone down in flames and/or in bankruptcy. I would call them **"flaming failures."**

Here is a graphical way to summarize what we might learn from these outcomes. We can picture the relationship between investment in up front Market Research and success or failure. The axis on the left is the ratio of Market Research investment to engineering investment, called the Marketing-to-Engineering Investment Ratio™ (M/E Ratio™), on a logarithmic scale.

Above (an M/E Ratio™ of) 1, the enterprise is investing more in Market Research than in engineering. In the right column are super successes. I have called the symbol in the upper right corner the **"money rocket,"** because it represents the way successful entrepreneurs like Michael Dell rocket to revenue and to financial success.

Below (an M/E Ratio™ of) 0.1, there is essentially no investment in Market Research. In the left column are the failures. The flickering flame in the lower left corner symbolizes the high-flyer "going down in flames, crashing, and burning."

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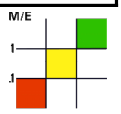
Parse out Marketing

Investment model – in time

Product is ready ↓

	Investment ratio	Developing the product	Ramping up sales
Front End (M)arketing	M/E™	✓	
(E)ngineering	1	✓	
Promoting			✓
Selling			

time →



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Marketing is a process of ascertaining needs which customers are willing spend money to satisfy, thus guiding engineering to design the right products. How much shall we invest in marketing to enable commercial success, and when?

At the request of the MIT Enterprise Forum, a world-wide support organization for enterprise, I developed a new metric to guide companies, the Marketing/Engineering Investment Ratio™ (M/E Ratio™). This model separates Marketing from the functions of promotion and selling. Formulating a ratio of Marketing to engineering installs Marketing concurrently with engineering, and sizes the Marketing budget with a readily identified number (engineering investment).

1 - Step one is to separate out Marketing from promoting and selling

2 - Step two is to add Time to the guideline. The white boxes on the right represent time slots. To the right of the "Product is ready" arrow is the time after you have completed the development the product: when you are ramping up sales. Promoting and Selling occur during this time slot.

3 - Step three is to relate Marketing to Engineering, NOT to sales.
Engineering is defined as the investment in developing the product, the sum of R&D plus development – either by product or by company. To the left of the "Product is ready" arrow is the time when you are development the product. Engineering occurs during this time slot. Marketing also occurs during this time slot.

4 - Step four is to call it an Investment instead of an Expense

If we normalize engineering to 1, then all we have to do is to find out what the ratio is, the **Marketing/Engineering Investment Ratio™ (M/E Ratio™).**

5 - Step five is to relate the budget to successes, NOT to mediocrity.
The Board wants growth and success, NOT mediocrity.

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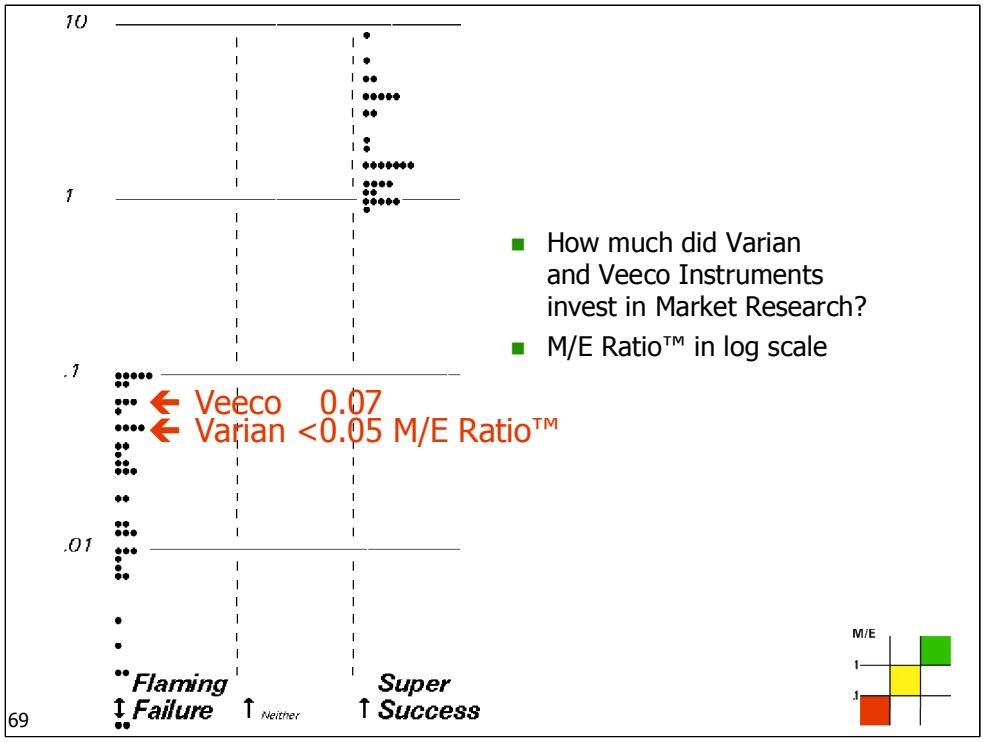

Let's gather the facts.

On the left is the Marketing/Engineering Investment Ratio™ (M/E Ratio™). We will use a logarithmic (log) scale to plot our data. At 1.0 and above, you are investing more in Marketing (exclusive of promoting and selling) than you are in engineering. At 0.1 and below, you are investing mostly in engineering, and essentially not investing in Marketing.

We will bin the data into three columns. On the left are the "Flaming Failures;" bankruptcies and business basket cases such as Varian Associates (for IMATT Oscillators). In the right column are the "Super Successes" like Cytyc; the creators of enormous wealth, employment, and societal benefit.

In the middle is the mediocrity, neither success nor failure. I am not interested in mediocrity.

How much did Varian and Veeco invest in Market Research?
Varian suffered from a M/E Ratio™ of less than 0.05.
Veeco suffered from a M/E Ratio™ of 0.07.

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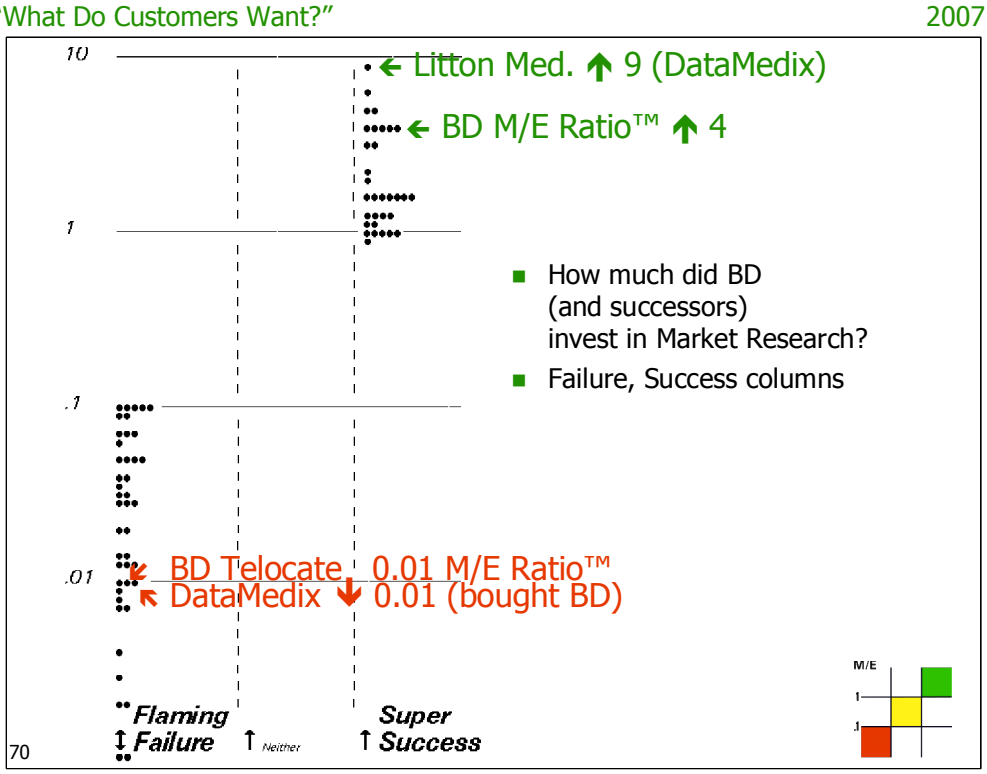

How much did BD invest in Market Research to understand the customer, to speak their language, and to articulate their needs? How much did BD invest to drive engineering, promoting, and selling? How much did this market research cost?

•BD Telocate, 0.01 M/E Ratio™, a failure.

•BD raised the M/E Ratio™ from 0.01 to 4 and became a success within 18 months. Market Research drove success.

•DataMedix bought the Becton Dickinson Medical Systems division (for $60 million in 2006 dollars), pumped more millions in (another $40 million in cash in 2006 dollars), but dropped the M/E Ratio™ back down to 0.01. They were bankrupt within 18 months.

•Litton Medical bought DataMedix, but raised the M/E Ratio™ from 0.01 to 9 and successfully rose from the ashes of DataMedix. Market Research drove success.

Same people, same customers, same market, same products – The difference is that Market Research drives success. The lack of Market Research leads to failure.

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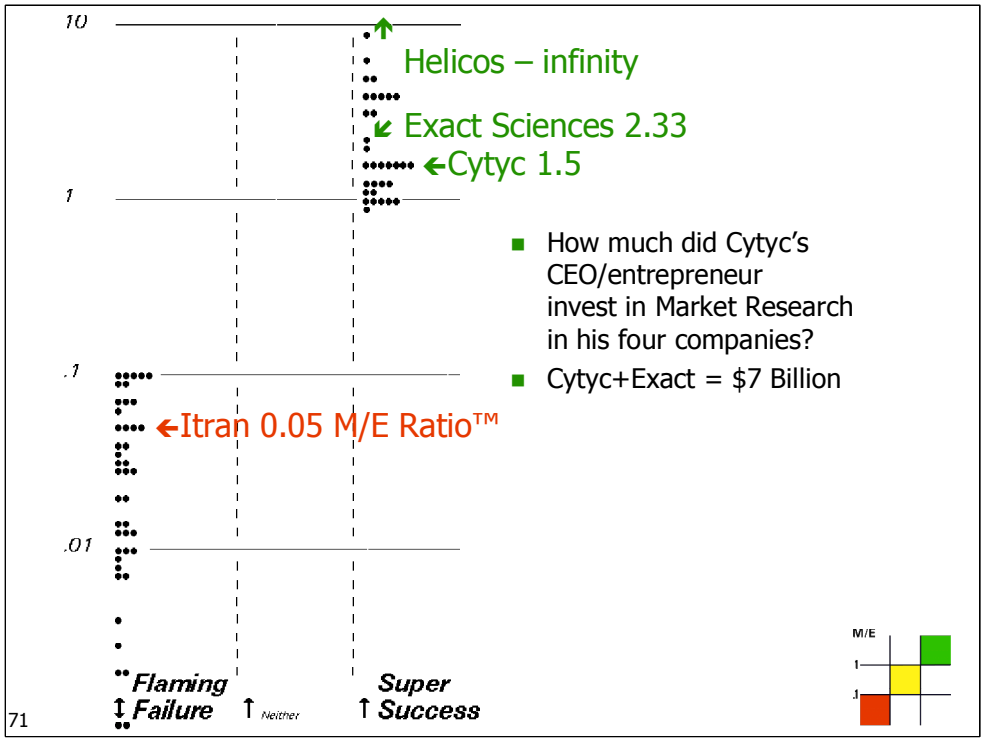

Itran, M/E Ratio™ = 0.05. Before Cytyc, Stan Lapidus started Itran. With due respect to my friend Stan, **Itran was a failure.** Stan launched Itran and took it to #1 in the machine vision market; an entrepreneurial and strategic success. However, the $15 million in VC investment only resulted in a company with $10 million revenue. Thus Itran was a financial failure.

How much did Cytyc's entrepreneur, Stan Lapidus, invest in market research to understand the customer, to speak their language, and to articulate their needs? Stan performed serious, formal market research up front (in concert with the technology development). He validated the market and validated the customer payback BEFORE (while) the technology was developed. He went to every Pathology, Cytology, and Pap screening conference in the world for years, sat in the front row, raised his hand, and asked questions. How much did this market research cost?

Cytyc, 1.5 M/E Ratio™, while Stan was still in the basement. It wasn't enough.

In his next startup, **Exact Sciences**, Stan invested **2.33** times as much in market research as in engineering (1995-1996), while developing world-class molecular biology technology for colorectal cancer screening, arguably even more complex technology than Cytyc's.

It wasn't enough. In his next startup, Helicos BioSciences, Stan invested $400K in real dollars and nearly a man-year in Market Research before commencing engineering. **Helicos M/E Ratio™ was infinity!** (end of 2003) Armed with market validation, the CEO raised $27 million in six weeks, then another $40 Million (early 2006).

One CEO/Entrepreneur, four companies. The common thread to Stan's success was the significant front-end Marketing investment; a M/E Ratio™ greater than one. Just two companies, Cytyc and Exact Sciences, created $4 Billion in market value.

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I am often asked, "Who needs Marketing? The product's not ready yet. How can you possibly suggest that we devote our precious capital to Marketing, much less more to Marketing than in engineering, when we have this heavy-duty technology to develop?"

Because **the evidence shows that technology-based enterprises which do not invest in Market Research fail.**

Invest more in up-front Marketing, exclusive of promoting and selling, than in engineering! Furthermore, invest heavily in Market Research, either before the engineering begins, or concurrently with the engineering effort, or both; before the product is ready. To an engineering audience, to the technologists, that might seem outrageous.

In fact, the evidence shows that successful technology-based enterprises do just that. **Super successes in this survey have a Marketing/Engineering Investment Ratio™ (M/E Ratio™) greater than 1,** investing, on average, more than two dollars in Marketing, exclusive of promoting or selling, for every dollar invested in engineering. They invest up-front, before the product is ready. They maintain a higher investment in Marketing even at the extremes of technology where you might expect more investment in engineering.

Every flaming failure suffers from an M/E Ratio™ of 0.1 or lower. The average failure invests only about two cents in upstream Marketing for every dollar in engineering.

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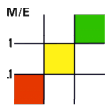
Marketing steers the enterprise

- ☑ Market Research to understand customer needs, competition, payback, buying behavior, food chain …
- ☑ Market Research steers engineering
- ✓ Engineering develops technology
- ☑ Market Research steers promotion (and P/R)
- ☑ Market Research steers selling
- ☑ Market Research steers sales support and service
- ✓ Sales gets purchase orders
- ☑ Market Research steers manufacturing
- ☑ Sales (shipments)
- ☑ Invoices
- ✓ Revenue



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Myth – the path to revenue has two steps:

1. [Sales obtains] Purchase orders
2. Revenues

Reality – There are more than two steps to revenue.
It begins with the front-end process of understanding the customer:

1. Market Research to understand the market, the customer, the competition, customer payback, customer buying behavior, and the food chain.
2. Market Research steers engineering
3. Engineering develops technology
4. Market Research steers promotion
5. Market Research steers selling motion
6. Market Research steers sales support and service
7. Purchase orders
8. Market Research steers manufacturing
9. Sales (shipments)
10. Invoices
11. Revenue

Business can be considered a process of checking off all the boxes in a check-off list.
If you skip a few and don't check off all the boxes, or if you check them off out of order, you must go back and fill them in.

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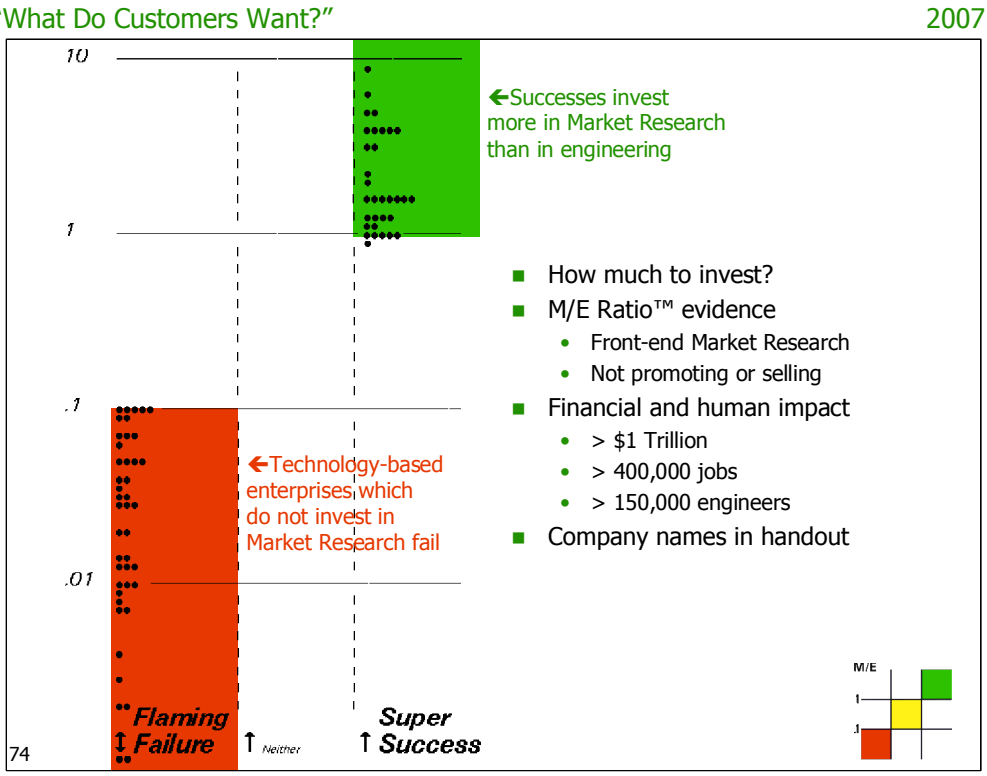

The magnitude of the upstream Marketing process requires decisive resources. **The enormity of the challenge simply requires it.**

Some have called me one-dimensional. I suggest that the evidence shows that **upstream Market Research is the one dimension that matters.**

More than $1 Trillion is represented either in value creation by the successes, or in capital squandering by the failures. The human impact has been more than 400,000 jobs created by the winners, or lost by the basket cases; and more than 150,000 engineering slots fashioned or vanished. The data are consistent from the 1950s into this new century, from startups to Fortune 500 firms, and across a broad range of technology-based enterprises.

How much investment is needed to gather facts, to develop the questions, and to surface the answers? The MIT Enterprise Forum asked me to invent a method to answer these questions.

A new metric has been developed to address these issues, the Marketing/Engineering Investment Ratio™ (M/E Ratio™). This model separates Market Research from the functions of promotion and selling. Formulating a ratio of Marketing to engineering installs Marketing concurrently with engineering, and sizes the Marketing budget with a readily identified number (technology investment).

Thus the Marketing/Engineering Investment Ratio™ (M/E Ratio™) was developed at the request of the MIT Enterprise Forum to guide technology-based enterprises. The theory, data, and practice of the M/E Ratio™ were then taught for several years during MIT's entrepreneurship program, and subsequently incorporated into the foundation of the popular MIT Sloan School of Management graduate course, "Starting and Running a High Tech Company."

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Upstream Market Research Tools Find The Facts

What Do Customers Want?

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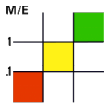

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