

**A STUDY OF
CORPORATE CULTURES
IN THE
COMPUTER INDUSTRY**

IBM

AUGUST 1983

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IN THE
COMPUTER INDUSTRY**

IBM

Prepared for
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Management Overview

General Findings

Computer Systems Vendor Cultures are different from applications cultures.

Computer Systems Vendor cultures differ from each other

Marketing
Technology
Financial

IBM Findings

IBM is a marketing company

Quality is corporate-wide. Every person is quality trained and quality conscious.

IBM knows who their customers are, how and when to sell them what they will buy, and how to keep them in the 'family'.

IBM knows who makes a good employee, how to keep them happy, and how to develop them for the good of the corporation.

The administrative structure is created to facilitate the process with strengths in long range planning and budgeting strategy.

The technology is reflective of the pragmatics of the customer and employee requirements.

The culture allows much flexibility to the CEO's.

PREFACE

Let me take a moment to acknowledge the people who worked to support this project. Without them, I could never have produced such volumes of work in such a short time. First, there were librarians, Charlie Matthews at the ZK and Betsy Cane at the ML libraries. Both used extraordinary amounts of innovation to find the references I have included. Then there is the SAC CQG who sponsored this project, and supported its effort with countless conversations, editing, and care, is notably the Central Quality personnel Steve Beason, Gary Gottschalk, Andrea MacMillan, Steve Heiser, and Pat Cox. Thank you.

INTRODUCTION

APPLICATION OF CULTURE RESEARCH
TO THE COMPUTER INDUSTRY
ENVIRONMENT OF THE HARDWARE VENDOR

Why Study Culture?

Culture: A style of social and artistic expression peculiar to a society or class. -American Heritage Dictionary

This is the first of a series of studies on corporate culture that will be produced by July 1984. The corporations that will be studied are IBM, Japan, (notably Fuji and Hatachi), DEC, and HP. All project research has been done from the open literature; no personal interviews took place. The style used is to facilitate reading. Credits for sources are contained in the bibliography. Summaries and comparisons will be taken after reviewing Japan, DEC and HP to determine if any global lessons can be learned that will be of use to DEC.

Why should we computer system vendors study corporate cultures? What do the studies mean to us, what will we gain from them and more importantly, what will we lose if we do not study another culture?

The computer industry is growing and thriving in many areas. There are already many acknowledged subcultures. The world of EDP is acknowledged as being very different from our culture. Additionally, there are academia, science, medicine, military, banking, and insurance to name a few of the other subcultures.

The world of computer system vendors is often characterized as a single culture, but can an IBM employee and a DEC employee easily change jobs? The more important question is, can we at DEC easily transfer technology from IBM or any other hardware vendor and expect to set the same results? Will people and processes profit from their experience? Have we been too lax in deciding just what we can use and what we do not want?

An understanding of how culture effects us will enable us to make informal decisions.

Both technology and human beings are evolutionary. The human is the product of her environment and experience. When we hire a person we get not only experience and technology, but attitudes toward management, group cooperation or non-cooperation. As people are hired they bring new attitudes and it becomes the task of management to shape these attitudes to the advantage of the corporation. It would be easier to select people who would fit well into our culture, if we could explicitly communicate our cultural expectations. Cultural factors are communicated in very subtle ways.

Technology is created and evolves within a culture. The final product is

what worked best within that culture. The product is packaged and presented to the consumer world, who in turn inspects and tries this new tool or technique.

Consider carefully, what may work in one culture may not work in another. The academics recognized this in the structured revolution. Structures helped many people, but also caused much havoc. We still do not know if structure brought us the solutions we were seeking.

The message here is to know your own strengths and weaknesses and what will or will not work in your environment. We need to be more aware of who we are and what types of technology work well within our environment. Once this is established, go after that technology keeping an eye on how we can improve and surpass current development. In the world of global technology, restricted budgets and limited personnel, we must direct our resources and maximize our strengths to achieve the desired payoffs while minimizing our weaknesses.

Three Types of Culture in the Computer World

There are three types of cultures in the world of the computer system vendors; marketing, technology and financial. Each has its primary strength in its specific area and weakness in the other areas.

The marketing based company believes that service and sales are everything. They maintain closeness with their customers. They are not necessarily innovative technically unless the push comes from their customers needs. They are likely to be more innovative in manufacturing because they must increase their sales and support with good products. Another weakness is that their technical people may feel stifled by the extreme emphasis on the customer. They cannot devote enough time to innovating to push the state of the art. This type of company is capable of being very profitable, such as IBM. If they do not devote enough time to innovations, they will end up looking like a bunch of used car salesmen having meteoric rise, which they will not be able to maintain. In any event, a good financial plan would be necessary to support a long-range program. This is especially important when the product is no longer new. Companies must change their focus and push funds into research to keep a product line current. This is especially true for a computer industry with its rapid changes in technology.

The technology based company is known as innovative and creative. They constantly move the state of the art. This often presents their two greatest weaknesses, finance and marketing.

These companies are often over budget and late. Their creative process is not well suited to these structures and control, nor do they consider inflation and market windows. Additionally, without proper customer product research much time could be spent developing a product that is not saleable or needed by consumers.

CORPORATE CULTURES - IBM

Technical companies innovate, create and publish. Two things may result from their efforts; (1) marketing or financed based companies may attach themselves to the product, repackage it, and sell it as their own or (2) great strides will be made for the industry, but due to poor marketing it will never make an impact within the industry. The great ideas will end up in history books long after the technical company is bankrupt.

These technical companies must learn to plan and budget so sufficient resources are left to market and service the product, not simply develop them. This involves the evolutionary process of planning, budgeting, marketing, service, management, and all the metric controls that show you are staying on course.

Secondly, these companies must return to their origins, people. They must remember that their most important resource is the creative employee who develops these technical marvels. They must work at finding good people and keeping them, while appreciating and managing them in ways that increase loyalty, quality, and productivity through cooperative team efforts.

Financially based companies have been created as spinoffs of the success within the industry. They are different from the other two in that they are often funded and managed by the people who are not spawned by the parent industry. These companies are riding the wave of computer success. The companies that seem to be the most successful, have taken one product and supported it while they learned the ins and outs of the industry. They must learn how to market and service the customer while maintaining profitability. Additionally they must learn how to stay current in an everchanging technical world where there is a fast turnover rate among people and a shortage of good people. Japan started its computer work for financial reasons.

All of the above is complicated by the personality of the computer scientist. These people have strong morals and ethics and will leave any company to uphold their beliefs. They know they are in demand and play the market for it. Since their home is often in their mind, they will not easily develop allegiance to a company. The company who keeps good people has figured out how to satisfy the computer scientist's needs and is well on the way to success. They must also manage these people.

Further, one must ask, is one culture better than any other? No, absolutely not. It is important to know and understand what makes culture, and the strengths and weaknesses that come from having this knowledge. Those who study culture must possess the willingness to act creatively to solve the problems brought out of a culture study. Those who study cultures must also realize that not all solutions will work, nor will they all fail, but they must maintain the attitude; to strengthen the weakness and maximize the strengths, thus maintaining a good environment.

Introduction to IBM

A great deal has been written about IBM's culture. This article is based on four months of my research.

Culturally, IBM is a top down, marketing type of company. IBM maintains a strong top management structure that employs an innovative check and balance system. This basic philosophy created by Tom Watson Sr. still prevails; "One must adopt an attitude of cooperation with one's management." This kept in check by a company that encourages employees to contact anyone, no matter their position or rank, to do the business of the company.

IBM is considered to possess the best marketing and service in the industry. They keep close contact with their employees and customers. This is their greatest strength. IBM has increased their research and development, manufacturing, and financial process with amazing timing and tenacity. This has been the greatest contributing factor to preserving IBM's position within the industry. This is due largely to the foresight of their CEO's and their enormous cash reserves.

I. QUALITY

Continued favorable customer perception of IBM's products as quality products is assured because IBM knows and takes care of their customers. IBM's philosophy about people, both employees and customers, is legend. Quality in products is achieved by informed employees who are aware of customer needs and requirements. IBM policies and management mechanisms are all directed to support the production of quality products. No single inspection or process makes a quality product. Quality products are the result of everyone caring every step of the way.

IBM set up its original quality model using Phil Crosby's philosophies. They have trained extensively throughout the company to reinforce Crosby's philosophy. Additionally, in manufacturing they installed an employee identification system to trace defects.

Harlan Mills, the famous manager of the Time/Life project describes their activities in the following manner: 'Software engineering has evolved in FSD from an unpredictable group activity to an orderly and manageable activity for meeting schedules and budgets with high quality products.' He goes on to say that the basis for control is mathematical discipline. 'Key management standards for software engineering in FSD based on mathematical theorems about structure and organization of large systems to eliminate the possibility that such choices will be based upon management style or individual experience.'

It has been commonly accepted that software programming cannot be done error-free. IBM claims to have achieved error-free software programming. An IBM team of eleven people developed 20,000 lines of code without error, in final test. At the beginning of the scheduled 12 -14 month project, the team fell almost two months behind schedule because of their concentration on planning to meet the defect-free program. Management observed the phase review process but never, during the entire program did they ask about cost or schedule. The team attitude and clear ownership drove the project from a Quality planning viewpoint. Completion exceeded all expectations when final tests showed 20,000 lines of defect-free code, 45 days ahead of schedule.

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II. CUSTOMER

United States Government

IBM has been the first to volunteer its services during war or conflicts. They did this first in World War II when they volunteered to do the calculations of the war. They did this using their basic products. This kept them from a major retooling and gave them a ready access to a new customer base. The literature is full of stories of how they interacted with generals to find out their needs and how they converted these needs into a new technologies that were carried to the battlefield, along with the tanks and the medics. This accomplished many purposes; first, many military people saw that IBM did the calculations, second, IBM built a solid customer base with the military and the US government, and third, they had the opportunity to build new technology and test it under adverse conditions. Therefore, it was no surprise that after the war they were ready for peace activity. IBM's financial planning tied in with their marketing expertise in that they also only took 1.5% profit on military experience and gave the rest to the widows and orphans fund. When our GI's came home from the war, having gained experience with IBM machines, they also saw that their buddies families had been taken care of. It is no wonder that they inspired such customer loyalty. This was repeated in the Korean conflict.

On the other side, the government persued IBM for years in an antitrust suit just recently settled. This Justice Department decision was based upon the fact that IBM actually did not break any laws and did not use their enormous power to obstruct other companies from encroaching their territory. It was interesting to note that the economic philosophy of the time (late 60's) was that there is no prevention from such actions once a company gets so large. The only thing to do is to break it up into smaller operating units. What did happen during those years is that IBM developed an understandable paranoia about communicating their operating procedures to the government or to the outside world. Now that the suit has been dropped, we can also see that the time was well spent planning long range action regardless of the outcome of the lawsuit. An example of this is their return to the services market which has an annual growth rate of 17%. They created a series of one-stop shopping centers to lock in the potential customers by starting them in remote processing, moving them to time sharing and finally locking them in with networking. IBM has always believed that software is the name of the game, that hardware will only take you so far and that the real profits are in applications.

Foreign Governments

First of all it must be remembered that European operations are 50% of IBM's business with operations in more than 50 nations. They suffered legal setbacks in the 1970's forcing them to maintain processors with PCM memories. Europe is currently enacting privacy laws that will affect data

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crossing country borders. How this will affect IBM and all computer manufacturers is still unknown.

IBM has a policy of 100% ownership in a foreign nation and they will leave the nation before acquiring. As a result they had to leave India, Nigeria, and Indonesia.

IBM and Japan have had a most interesting relationship. Whenever they seem stalemated, the Japanese government makes a graceful retreat and IBM, with equal grace, has increased its manufacturing and educational facilities. IBM's constant transitions to handle new market threats has had an upsetting effect on the Japanese as they do not understand it.

MITI was surprised when IBM requested that they participate in their fifth-generation computer program as the Japanese see this program as their way to take over the American computer market. The Japanese did not understand why IBM would be so willing to participate. However, this dramatic situation was the first time that a Japanese research program has been opened to a United States Company, even if the acceptance was reluctant. There is private belief the Japanese now feel delighted that IBM will use their advanced technology to help the Japanese develop their fifth generation computer. It is believed that MITI will not really allow full technical cooperation but will allow for exchanges of token information for crucial IBM information. However, IBM feels that they can pressure MITI into real technological concessions. In the past, the Japanese government has gotten competing national companies to bury their differences and work together only to go after the American Market. A foreigner will have much difficulty here. The future will tell if this was a good move for IBM or if IBM is being marked for sacrifice by Japan.

IBM rarely enters into joint agreements for research and this move with the Japanese is by far the largest they have ever undertaken. This is a real indication that IBM has abandoned their 'not invented here' philosophy for competitiveness in the marketplace. They may also be opening up a section of the Japanese marketplace which was previously out of their grasp. In any event, the development in technology might show up in their other lines. IBM could be moving toward becoming technological innovators in the computer field as they recently have been paying lip service to such an idea.

Whenever IBM enters a country, they always staff the office with nationals from that country. They have always had an ability to be friends with heads of state and other important people within a country (another legacy from Tom Watson, SR.) and many times this has helped pave the way. They inspire amazing company loyalty, even on occasions when it is in conflict with the employees country of birth. Again, to mention World War II stories, it seems that whenever the Axis powers threatened to confiscate a customer's machinery, interesting events transpired. An entire machine room might disappear, or crucial working parts to the customers machines would disappear only to magically reappear after the war. Employees and customers who had the wrong religious background also seemed to magically just escape internment in concentration camps only to return to the country, if they so desired, after the war. IBM's policy is to depend upon no country or government for the right to do business.

IBM and Customers

IBM knows their customers. They take weekly surveys to keep the pulse and quickly take care of any ills. There is a very real lesson to learn from an IBM customer who described why they chose IBM over other competitors. "Many others are ahead of IBM in technological wizardry. And heaven knows their software is easier to use. But IBM alone took the trouble to get to know us. They interviewed us extensively up and the line. They talked our language, no mumbo jumbo on computer innards. Their price was fully twenty-five percent higher, but they provided unparalleled guarantees of reliability and service. They even went so far as to arrange a back-up connection with a local steel company in case our system crashed. Their presentation was to the point. Everything about them smacked of assurance and success. Our decision, even with severe budget pressure, was really easy."

When a potential customer contacts IBM, within 24 hours or less, they receive literature, a personal visit, a demonstration, whatever they require. If they need technical assistance to make decisions, that is also provided. If the customer is big enough, they might also get their own IBM person who has an office within their corporation. They are contacted constantly to see if anything is needed or if there is anything that IBM can provide. There are a wealth of courses that can be taken to learn their IBM equipment. Hard sell is the word. IBM delivers.

However, if the customer were to consider switching to another vendor or adding equipment from a PCM an interesting event occurs. The top decision maker in that corporation would receive a request for lunch and interesting innuendos would be dropped about the competence of the Data Processing Manager or whomever the person is who made that offending decision. Therefore, IBM has an interesting love/hate relationship with their customers. This situation has caused IBM some embarrassment, however, and there is some evidence that the corporation is taking steps to see that it stops happening.

For the majority of the marketplace, IBM serves the purpose. They provide quick efficient service. They provide for all of their needs. Since they are the biggest, there are many people available with the specific experience that a customer requires and that cuts the learning curve costs. Since there are so many customers, there is much software that can be bought and traded. To many people the name is all that matters. IBM knows and takes care of their customers.

Many customers do not actually know the truth about IBM because they do not look anywhere else. For example many people think that most of the new technology of the industry comes from IBM. They have been credited with the creation of virtual memory when RCA actually should get that credit. For years IBM had some of the worst figures in MTBF and MTTR. These are offset by the image of the IBMer who gets a call in the middle of the night and who works until the entire problem is solved. In the 1968 election when the machines of one of the major networks went down on election eve, IBM New York jumped into action, brought in their personnel and put one of their facilities at the disposal of this network. There are many stories

of natural disasters when IBMers were let off work, with pay, to help in the recovery. Their dramatic flair and their size has often covered when technology did not. What makes them even more awesome is that while they are covering with the dramatic, they are planning how to provide additional technical coverage.

Marketing

Francis G. (Buck) Rodgers, Marketing Vice-President feels that it is a shame that in so many companies it is an exception when you really get good service. IBM will not be an exception. Everyone gets into the act. Many innovative ideas come from customers because IBM listens intently and regularly.

IBM's strongest points in sales are image and service. Their image is arrogance and pretension. They follow this up with a reputation for fast attention in service. Their client lists are carefully protected. Whenever a competitor shows up at a client's shop, they are alerted by either their own onsite personnel or by the client's personnel who have been cultivated as spies. This way they can 'happen to be in the neighborhood' at the right time. The banks and IBM work together, IBM sells them computers and they lend IBM money. However, IBM never concentrates their resources in any one market. They form task forces to look into any potential issue from new markets to problems. These can last from a few days to a few years.

Branch managers are the closest to having an empire in the company. They are held responsible for anything that occurs in their area. This gives them the illusion that they are master of their own fate.

Customers have come to fear IBM's awesome power. If they should decide to change vendors, a sales person might just 'happen' to visit one of their top executives for a quick chat in which innuendos might be passed regarding the competence of the person who might want to change vendors. Many times this employee finds themselves out in the cold. In the customer world, it is common to hear 'he got his job from IBM' meaning that this person will always choose IBM as a vendor and IBM tells his top management that he is a good person to keep as a result.

Sales people are in training for 12 - 18 months. After that they go on full quota. However, then they are supported with communications, contests, and conventions. Replacing a competitor's machine gets more sales points than replacing IBM equipment. Getting points toward quota is a big thing. Then one gets to participate in enormous hoopla and receive all sorts of privileges and bonuses.

Never to allow surprises, paramount in the training of a salesperson. The minute you know something, you are to alert your manager so it can be passed up the line. IBM supports the sales people by having the philosophy of always keeping a moving target. This way they can change the hardware or even the software whenever necessary to give the PCM market as much

trouble as possible.

Cardinal Rules Of Sales Philosophy:

1. Thou shalt not criticize the competition.
2. Thou shalt not unhook - i.e. get a customer to cancel an order once written. If you lose one go on to the next one.
3. No bribes - This is an issue in countries where bribery is the name of the game. However, IBM allows no exception to this policy. There have been times of investigation that this policy alone has saved their neck.
4. Use your whole family to sell. Have your spouse active in church groups, country clubs, etc. Use your children. Whatever works to give the image that you are a fine upstanding family in the community will help you to open doors and sell computers.

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III. EMPLOYEES

How an IBM Employee is to Look to the Outside World

The IBM employee is has a rich vocabulary in IBM jargon. She dresses conservatively and carefully. She has an open engaging manner and communicates well singly or in front of people. Using visuals to describe her work seems second nature. She believes that long hard work will bring success, however, she must never forget the importance of community or family. She views are moderately liberal, but she will not discuss politics with you. She reverts education. Travel is easy and comes often into her life. She is in favor of the arts. Most of all she believes in strong structures and good management practices.

IBM World as seen by the Employee

IBM's second strongest belief (after the customer) is in the dignity of the individual. To assure employee satisfaction they started taking employee surveys in 1968 and are still continuing. An entire group is surveyed. If the score rises or falls out of the expected range, an explanation must be given by that manager. The manager gets the composite group results and must meet with the group to discuss the results. The manager is expected to work out personnel problems in such a way that happy employees result. This is a valuable check in this highly structured organization.

The job enrichment experts hired were Saul Gellerman and David Sirota for domestic and Geert Hofstede for World Trade. Each of these experts were actually IBM employees during the time that they did their work for the organization. They were allowed to publish their works later when they terminated as long as they did not use IBM's name. Hofstede did "expectation research." He asked what each employee wanted from their job. What he found was that, using a scale of 19 goals, the country of origin was not at all important. The important issue was the kind of person who took a certain job class. All plant workers, for example, chose the same heirarchy of goals. This heirarchy was different from the technical staff who chose a homogenous set of goals.

The world IBM offers to its employees is consistent and fair. There are no unnecessary layoffs. Security is carefully preserved. They always try to pay 7% above the norm especially in Manufacturing. Extra pay is given for extra motivation and large corporate payoff. There are bonuses, prizes, awards, and suprises. There is actually no extreme bonus program. People just get checks or tokens out of the blue for something they did. They have a world wide stock program that has made quite a few employees rich. There are also interest free loans and executive stock options for bonus work.

Changes are evolutionary and sober. They are to be handled with

flexibility because the employee will always be cared for. The company gives a clear cultural message that is to be followed. IBM, in return offers each person an affluent middle class existence with interesting hard work and wonderful extra benefits.

Personally, employees are expected to try to keep their marriages together. Divorce was a factor in promotions until recently. There is a lot of pressure from within the organization to be faithful. The company wants to keep a pleasant, conservative image. They project the message, 'Be a workaholic and have a fulfilling family life'. Personnel helps spouses and families with relocation. Any employee can take out a loan or request assistance from any IBM office. Since people are moved so much these avenues of assistance are the only stability a family often has in a strange land. Additionally, when an employee is sent on leave or on a job assignment of any length, there is one person in that person's old department who is assigned as their reentry buffer to keep them posted while they are gone and to ease their reentry.

The people have two age levels of identity crises with the organization. The first is a personal identity crisis at 25 years. The second is a crisis at 40 when they are more concerned with where they are going with the company.

One interesting factor is that for an equal opportunity company they identify their minority problems and state the status of solution to that problem. For example they say they solved their problem with women in the 60's and Jews in the 60's. Blacks had to wait for a solution in 70's. Foreigners still think that they are second fiddle to domestic. There is only one ranking foreigner in the corporate office, Maisonrouge. Finally, there are two ladders of promotion, technical and administrative. The technical ladder tops out much faster than the administrative one.

There are lots of rewards for doing a good job. There are also lots of new jobs. No one will ever get stale or create an empire in this company. The company is the empire. People are never moved up directly into their boss's job. That would be too threatening to the boss. Therefore promotion always means transfer. People in constant transition transmit the local perception of the institution instantly to the new location. This is a stabilizing characteristic of the culture.

Employees are encouraged to phone each other anytime and often. This creates a kind of 'old IBM' network which facilitates the constant transition and keeps communications open throughout the company.

Management however, has a different picture of the company than the average employee. Since a goal of the organization is happy employees, most of the policies are in that direction. A manager is defined as anyone who can hire, fire, and be responsible for the pay of 2 or more subordinates. This constitutes 12% of the population. When an employee has a complaint about a manager, they are encouraged to use the 'open door'. The first action that occurs is that manager is interviewed for the facts of the situation. As a result most managers are a bit paranoid and keep meticulous written records about all employee interactions. An employee is considered right until proven otherwise.

In this win or lose organization, that means a lot of managers lose. IBM feels that they choose tough managers. A 'soft' manager is going nowhere with this company. Managers are paid to take flak. As a result, there are few personnel or education based (social science) people in the top management positions.

Training

In IBM everyone goes to school. Tom Watson Sr. once said, 'There is no saturation point for training'. He also said, 'Salesmen are not born, but taught'. Employees are all sent to training lasting over periods of months before they are sent out on their own so they can handle any situation. Over \$100,000,000 is spent each year for employee training.

IBM believes they are responsible for people failing. If something goes wrong, then they did not provide them with adequate training. Therefore, they have a total charm school which begins with presentations and ends with the technical material to put into the presentations. Each division has its own Director of Education. Education helps sell products.

With each promotion a manager gets a week at the corporate school. Every 3 to 4 years there is also a week's refresher course. The course subjects range in topics. The following is a list of a few of them:

- People managing skills
- IBM beliefs applied to the current environment
- Managing managers
- Effects of political, social and economic changes in the computer business.

Executives are trained at their own graduate school at Sands Point, Long Island, New York. There is a 4 week management school. A person is chosen to attend the course by putting management interest in the long range goals section of the appraisal form. (Appraisals are performed yearly and a person gets negative points for not having short and long range goals). Then if through negotiation the person and their manager agrees that they are management material, they are signed up to attend a screening.

The management screening program consists of 3 groups of 7 people. It is a case structured course with people learning more from their own group members than from their instructors. The instructors are then free to evaluate. Each member of the group receives personal observation. At the end of a course each is evaluated, but the evaluations are forwarded back to that candidate's line manager who tells him/her the results of the experience.

IBM knows that through training the culture is preserved. They also use training to ensure that their own brand of computer jargon is the one that all their employees use, especially with customers. This jargon training is also a way of preserving the culture. Some types of training that IBM offers are clerical, job development, industry specific, negotiation and advanced negotiation, marketing and advanced marketing, management,

planning, and customer training. Customer training is seen as an investment in marketing.

Awards

IBM uses any good excuse to award an employee. They then do it with lots of fanfare and hoopla. This means that they go the great lengths to define an individual's contribution to the company and to reward as many as possible with as much fairness as possible. Of course, some get left out, but not many. As soon as management can identify a particular achievement the person responsible gets an award. The way that people are shown how important they are to the company is that top management is a part of the reviewing and presenting process.

An example is the 100% club for salespeople. The manager of a 100% Sales Branch recently rented the Meadowlands Stadium in New Jersey for an evening. After work he had each salesperson run onto the field through the players tunnel. As each emerged the electronic scoreboard flashed each person's name to the assembly. Executives from corporate, employees from other offices, family, and friends were present to cheer loudly.

Some of the types of technical awards given are:

- Outstanding Innovation Award
- Research Division Outstanding Contribution Award
- Corporate Award
- Invention Achievement Award
- Research Division Award

Awards have been known to range from tokens and hoopla to \$50,000. Awards recipients are told as soon as possible of their impending award. Then the actual presentation is not so emotional. The emotions belong to the friends, family and fellow co-workers. The awards are presented in some formal way like a dinner or a luncheon by a suitably high executive, like lab director, etc. Each award is given some publicity. Sometimes the award is given with many tokens as well as a cash bonus. The tokens include a plaque, tie tacks or other items of jewelry. They can be seen worn proudly by many IBM employees who show, 'I really do count here'.

Stock options are given only to some 700 executives who the company feels have a material effect on the profit performance of the business. About 60 also receive bonuses tied to the performance of their particular division. The top dozen executives get extra rewards comensurate with the year's profits. There is no evidence that this is publicized.

Opinion surveys show consistently that the employees love these award programs. Managers also like them. However, they report that they complicate their lives some. The smaller the award the more complicated to show individual effort from the team.

Penalties

A scapegoat system is used whenever there has been wrong doing. It looks good on the outside to have a person to blame. That way the company is never totally to blame. Therefore penalty boxes are set up to protect the sinners. They are always in another location while the current local furor is dying down. You can always reeducate a person. Everyone is basically a good employee who will be redeemed in time.

If the person is a constant trouble maker they might be sent to Siberia. This is worse than a penalty box, it is for the rest of that person's working life. IBM feels this person cannot cope, but they are still useful to the company. Only in extreme cases is the person fired. This only happens after all attempts to salvage them have failed. There is a box on the exit form for all employees leaving the company which says whether they are rehirable or not. There are jokes about that magic box. People always want to feel that they can go back to IBM if they don't make it in the outside world.

What does IBM do when there are too many People?

The problems with lifetime employment are that you can end up with too many people that are good and not make way for the young. The company needs to be able to hire new groups of people all the time to keep the evolving and to assure stable long term growth. There are also those who are essentially retired but still producing enough to keep or for whom the company still feels a responsibility. These people also take up space. IBM has handled the problem of too many people in the past by using attrition (non-replacement of people who leave), early retirement, and increased leave taking.

There are other methods also used. The labs begin doing customer support and marketing support to generate their own incomes. Retraining and moving is increased, but the employee whose group was just disbanded gets only one choice of move. Finally pressure to attrit is applied by providing rapid task changes and lower personnel ratings with higher goals.

This last has been known to backfire in their face when the most qualified have been known to leave when the lesser qualified hang on and crumble under the pressure. In the early seventies there were raids on good employees. The most notable were RCA and Ling Tempco Vought. There is some proof to the speculation that an IBM employee needs alot of time to adjust to the outside world before being productive. These raids certainly did not help those two companies. Whenever one of those people left they were approached by 2 and 3 levels of management to find out why they were leaving even when the company wanted to reduce its workforce. IBM feels that they want management to have the power over who leaves or stays, not the employee.

Being a part of the IBM culture is such a lasting experience that some

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people joined together and produced an Alumnus Directory. Of the some 2500 names listed nearly 1000 hold VP titles in their current jobs mostly with computer related companies. IBM is playing a large part in the way the world handles its computer business.

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IV. ENVIRONMENT — Administrative

IBM Image

Early in the 1950's Thomas J. Watson was walking along fifth avenue and he saw a striking window display describing one of IBM's competitors. He liked the colorful display and decided that something similar should be done for IBM's image. Today whenever you look at a building or a of equipment it carries that IBM image with it. He improved the IBM design from that point, not only in architecture and typography but also in color, interiors - the whole spectrum. The key architect was Eliot Noyes. He came up with the modern look that IBM employs.

From the start the IBM image was always to celebrate all components in striking color photography, even in company publications. They then added safety glass in the early computer covers to show off the working parts.

Many architects were hired to design the various constructions which are continually being built around the world. However, they always carry the modern IBM image with clean, clear design. At one point they may have gone too far. They treated the apple trees in the old Armonk orchard so they would bear no fruit. There are no rotten apples in IBM.

In the company's recent advertising campaign to sell the personal computer, the stress is low key benevolence. Even the shows that the corporation chooses to sponsor on television are considered first rate, ballet, etc. They want it said that IBM brings classy productions into people's homes.

The company has always hired experienced journalists and paid them well to keep a good image with the press. Their goal is to work the press the way a skilled politician works crowds. This is so important to IBM that they share directors with many of the large media companies like the New York Times, Time Inc., the Washington Post, and CBS.

However, the most impressive showing that IBM has is its people. IBM's particular respect for its people seems almost a fixation to many. The top management has always spent more of its time on this subject than any other. This company doesn't spindle, fold or mutilate anyone. It is never difficult to spot an IBM person in a crowd.

The instructions for dealing with the press are as follows:

1. If you tell the truth you never have to remember what you said, but you do not have to tell the whole truth. Believe in free press but free means that a person is not obligated to provide information. Silence is also an acceptable answer.
2. Never answer for anyone else. Never give out anyone's phone number. Have them call back.
3. Never gossip. Never use colorful language. Never confirm 'I heard...' questions. Never comment on the competition.

Heroes

When looking at IBM culture consideration must be given to its evolution. IBM's top executives are home grown and are famous for their intelligence and tough personalities. This causes some interesting fighting at the top until a final decision is reached. Tom Watson Sr. had a strong dramatic charisma. Much of what he created still remains today. Then Tom Watson Sr. stepped down to Tom Watson, Jr. in domestic and his brother Dick Watson in World Trade. Out of a healthy sibling rivalry, the company grew. They added to the culture. There are no more Watsons. The company has passed to other men who were also home grown and who moved up the ladder to the top. Yet it is amazing that such a powerful organization has had only 6 chief executive officers in over 70 years and that three of the previous chief executives now serve on its board.

Lessons Learned From Tom Watson Sr.

1. Provide the climate for 100% success. Give deserved promotions. Always give outstanding effort.
2. Take most employees out of school. Put them through a long training period. Keep refreshing this training throughout their working lives.
3. Three basic beliefs; customer service, loyal and happy employees (with an emphases on loyal) and a boy-scout like striving for excellence.
4. Produce customer loyalty and the company will be invulnerable from attack. Use customer service to obtain the data to make the next technical changes efficient and applicable.
5. Never sell more than 5% of the stock. Borrow money in the precise dollar amounts needed. Limit expansion to cover the amount of the borrowings and current revenues. Always go after smooth gentle curves in rising revenue. Control the third party problem by making technology obsolete.
6. Sell yourself, sell your product. Dress splendidly and conservatively. Create a fanfare to get attention wherever you go (have yourself paged alot in hotels and airports).
7. Use the carrot and stick motivation for sales. Pay lavishly for success. Give lavish tongue lashings for failure.
8. Training is vital. Teach every nuance of speech. Write well and be able to use visuals. Teach showmanship. Teach how to cover up problems in sales and service.
9. Customers are to be handled gently, given confidence, convinced that they are in complete charge of the situation. Mezmerize them with the constant purring of working machinery.

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10. Encourage community service. Help out in all community crises. Always follow the golden rule. Church going is good for people. An IBMer needs family support. Be a patron of the arts. Always pay your taxes and debts.
11. Encourage fierce methods to beat the competition. Provide high commissions on sales. (100% clubs) Act as if you are much stronger than you are. Use showmanship. Sales is more important than technical. Provide a constant stream of contests with valuable prizes. Create reasons to celebrate.
12. Play together. (IBM country clubs, family dinners, etc.)
13. Create rituals. Create heroes.
14. Exhibit a near reverence for authority and demand it when your turn comes up. Be submissive to your boss. Show no conflicts to your boss, have them all worked out before hand. In times of great crisis hold loyalty to the company - even over your country.
15. Simple beliefs, great optimism, great drive.
16. Have friends in high places, however always have them on both sides of politics. Never have a political opinion in public.
17. Support the armed forces by providing up to 2 years off with pay.
18. In times of economic recession spend more money to create warehouses of equipment so you can be the first to go after the big contracts when the economy lifts.
19. NO ALCOHOL, push health.

Lessons Learned From Tom Watson Jr.

1. The IBM family includes the nuclear family of the employee. If you are a young single working for the company, they would prefer that you date inside the company so that technology stays inside, one big happy family. However if you were to find yourself serious with each other please let your management know so that they can make sure that you do not get put in an embarrassing management position together. Employees' children are welcome in the company but they must earn their own respect.
2. One world, one product line.
3. IBM is an institution that will last forever. Create the bureaucracy so that will be so.
4. Authorized the beginnings of personnel studies to raise morale which are still in use today. Relaxed the clothing and alcohol prohibitions. Still had strict ideas on how one was to behave personally and around

the customer.

5. Create a company that can have overnight change and be flexible to the outside so that everyone must keep on their toes to keep up with IBM. However, no matter how much the company changes, IBM will always care for its people. Keep a strong sense of team spirit, corporate ethic, emphasis on education and small company feeling no matter how large the company gets.
6. It is very important to be good and to do good and to be seen doing good.
7. 'You can make wild ducks tame, but you can never make tame ducks wild again. One might also add that the duck who is tamed will never go anywhere anymore.' Encourage employees to maintain their own personal integrity and independence, even laying their own job on the line if necessary.
8. Saw the need to increase the research and development that the company is doing to stay ahead in technology.

Lessons Learned From Dick Watson

1. International business in many companies cannot be as structured as domestic. There must be allowances made for each country's personality.
2. In order to cross from Domestic to World Trade all information had to go up the ladder of its respective organization and then down again, ONLY.
3. Create a competition with domestic for the talent pool so that international employees will also have a chance to rise to the top of the corporation. Known for picking people brilliantly.
4. Revenues should not be allowed to increase faster than profits. That is, this years profits must grow in proportion equal to or more than the growth in this years revenue.
5. Master the language where you are currently living.
6. If you find a problem you are expected to fix it.
7. If you have a negative message keep it behind closed doors.
8. Whenever something has to be done no matter how distasteful - IBM does it right.

Lessons Learned From Vin Learson

1. When the economy is bad attrition can be used to clean out some dead weight, even if you have to push a little to get the dead weight to leave voluntarily. This caused some insecurity about jobs for the first time in the company and a wave of personal lawsuits. The precedent for personal lawsuits has never been broken totally.
2. Clean house by eliminating some labs and other locations that are not cost effective. This can be easily done due to the flexibility of reorganization and life time job employment. The exceptions to lifetime employment are attrition, forcing people to move with only one choice of a job assignment, lower appraisals, etc. The principal of lifetime employment stays intact, but some good housecleaning occasionally never hurts.
3. Strong salesmanship and a forceful personality are necessary to get along in IBM.
4. What is important is the dollar value of time.
5. You can attract the best because selling a computer is sophisticated. People must become management oriented as salesmen. Young kids, twenty- five or -six, call on treasurers and vice presidents and see them living with their problems and making decisions. That develops a person. This is MBA business training on the job.
6. A salesman will write, cry and exaggerate, he'll be gentle with facts - that's life. There are two or three serious points to make in a presentation and all the rest is window dressing. An engineer will exaggerate also, but generally engineers are more factual. The financial men are the most factual of all but they can be so factual that they get lost in their numbers.
7. Managing technology is the key to the business.
8. About the antitrust suits, what IBM did was legal as the devil. 'If I were to live through (the pricing and leases) it all again I would do precisely what we did. It was right. This is a capital intensive business, and the little guys have tough sledding.'

Lessons Learned From Al Williams

1. Earnings per share and not the details are important.
2. The most interesting jobs are tough financially.

Lessons Learned From Frank Cary

Frank Cary was a division president by the age of thirty-eight, having held

6 jobs - starting with sales trainee - in eleven years. He was chief executive officer at 51.

1. Go where the action is. Be a doer. Be tops intellectually.
2. If one of your people is being attacked from outside it is your responsibility to protect them. However if they are wrong, then they will give a apology. Protect your people when they are falling apart.
3. Keep the inheritance growing and preserve its dignity. Show respect for the corporate tradition by not trying to superimpose your own too-dominant or colorful personality.
4. 'If I were to select one single business practice that was the most important to our success in the early days it would be that we only leased equipment. This put a discipline on the business that was excellent. It motivated IBM people and it built a great relationship of trust between the customer and the company. The customer knew he had leverage and the manager could motivate the salesmen, whose pay depended on their ability to help the customer get results.'
5. 'In general you have to manage the differences between engineers and be aware of their natural biases. You have to know when to rub them together and what the sparks mean, and you have to do it without producing personal conflict.'
6. 'Some aspects of beauracy are terrible, but some are essential. We have changed the organization every couple of years - changed approval procedures and so forth. If you leave the structure in place you endanger it. We don't change the organization just to be doing it - we change because our problems change and we need different leverage.'

Lessons Learned From John Opel

John Opel has the most varied background, having held jobs in marketing, manufacturing, product development, and finance, and having served as administrative assistant to both Watson and Learson. He also spent one uncomfortable year as chief liaison between IBM and the press. He never actually headed a division.

1. Management is open but disciplined with clear lines of authority and accountability.
2. High intellect can get engineers to do almost anything.
3. 'If you do your homework you're goin to know more than most other kids because most of them won't read the books.'
4. Set a goal and energize to achieve it.
5. 'At lower jobs it's good to have an automatic quarterback who does what

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you say without thinking, but it only works for platoon leaders. Above that, you need thinkers.'

6. When releasing a product you need seasoned people at the functional interfaces - you need patience and an unforgiving management.
7. 'Some people are played up as one kind of person or another, but most businessmen are pretty intense on their jobs. I consider myself pretty intense.'

IBM Corporate Structure

BOARD: elects officers, responsible to the stockholders, responsible for corporate business affairs.

Corporate Management Board:

1. Made up of the firm's most senior executives, an internal board of directors.
2. Replaces the Corporate Office and Corporate Management Committee.
3. Involves senior management in the corporate decision making authority in a broad way.
4. Has two standing committees: Policy and Business Operations

CORPORATE STAFF:

1. Corporate Finance Planning (CFP) - senior financial officers and vice presidents - responsible for business plans, economics, and information systems.
2. Corporate Operations and Services - (COS) - vice presidents of industrial relations, communications, engineering/technology, marketing, and personnel services.

OPERATING UNITS - (divisions) largest major change recently to provide a single unified front to the customer. Marketing and support staff were restructured from a product to a customer orientation. There is now one customer contact for all products. The actual division names were unchanged. What seemed to have happened is that the internal structure may have only changed at the top level. However, this may also be a change from too complex an organization and not technically advanced to an increased emphasis in technical innovation. IBM has gone thru several major re-structures. The current organization is set in three units:

1. Marketing and support

2. Large Systems Development
3. Small Systems Development

The Marketing and Support group is the group responsible for all customer contacts for all IBM's products. The large system development group covers all products except the personal computers, which are controlled by the small systems development group.

Planning

Organizational charts have little if nothing to do with planning process. The fact that these charts change so often enhances the company's privacy to the outside and facilitates employees feeling loyalty to the company instead of the organization. There are stresses that build among groups but they are seen as healthy competition.

Planning within IBM is done using the following assumptions.

All Jobs are Assured in the Organization.

This allows flexibility through reorganization. No one will be without a job. They may have to move, however. There is little turnover on the top of the organization.

All People are Grown from within.

Continuing and rapid change are inherent in the computer business. Competition is intense. The world economy is in flux. Governmental actions often affect the business environment. IBM feels that societies everywhere are moving through an 'age of discontinuity'.

All Agreements are to be made before They are Presented to the Top Committees.

Then the only arguments are between the larger concerns, like manufacturing or engineering. Once an agreement is made the issue is considered closed.

Agreement is made before an issue is closed by taking input from all the people concerned. Obviously a unanimous vote would be desirable, but a sizable majority is considered close enough. All possible outcomes are considered. Once an agreement is made the issue is considered closed and the people are expected to devote all their energy to a quick implementation. Since there are frequent employee polls to assure processes are used that meet employee satisfaction and since so much input was taken, morale is high and people put all their energy into the implementation. The idea is to spend so much time defining and discussing the problem with the people that the solution becomes apparent and agreement is a matter of course.

IBM has always taken the long range view when it plans. From experience

they have learned that management decisions, made earlier, will continue their growth even in recession years. Their goal is to maintain superiority in their traditional markets and to continue to compete in the growing information industry. They have spent \$7.9 billion in research and development and \$9.2 billion in plant and equipment in the last 5 years. Since 1976 they have added 2.2 million square feet in plant and lab space which is a 1/3 increase. They expect this to provide them with lowered costs as a hedge against inflation. This is consistent with the original strategy of Tom Watson Sr. who said to spend when revenues fall.

The bulk of the planning is not only decentralized within the several operating units, but is also further decentralized within any unit to the country, plant, and laboratory levels.

The development and implementation of unit plans are the responsibility of line management. A planning staff to support line management may exist at many levels, all the way to corporate, depending upon the scope of the issue. There are two distinct types of interactive planning; program and period.

Program planning is the planning of programs to develop a product or improve the productivity of a function. It generally has a single objective. It's time is specific to the problem. The review cycles are also established at the outset of the program. Period planning complements program planning by combining multiple programs and other objectives to achieve approved targets. It's time horizons are fixed by Corporate management to 2 years for the operating plan and 5 years for the strategic plan. The review cycle is tied to the calendar year to assure the availability of an operating budget. IBM relies on in-house econometric models to forecast each country. Two national income and expenditure models are used for the U.S.

The five year strategic plan includes corporate targets and operating unit goals, and product/system and functional strategies. It contains projected financial results over the plan period and compares them with corporate targets. These are assessed on the following; consistency with approved strategic direction, balance between objectives sought and resources required, relationships to plans of other operating units, and excellence in each functional area.

Based on the business direction in an approved strategic plan a unit then develops an operating plan which focuses on implementation over the current year plus two. It contains business volumes and workload forecasts as well as functional resource and financial plan commitments. The first year of the plan is exploded by month and function down to the laboratory, plant, and branch office levels. The resulting objectives and budgets provide a basis for measuring actual performance through the year. The plan is viewed as a contract between management levels. Actual results are reviewed regularly and corrective actions are taken to assure compliance with the plan. When significant deviations occur at a unit level, the unit may request approval for changes in its operating plan. These requests are all coordinated by the Director of the Budgets who sees that the proper body gets a chance to accept or reject the changes.

Budget

The Director of the Budget has financial control of the company. The business net profits from this year are measured by the earnings per share which must be on a steadily rising curve. To IBM, prudent management means the ability to maintain shareholder earnings as well as to find enough profit to plough back into the business for future net profit. There are contingency plans, special funds, and reservoir accounts to handle finances in the event of any contingency. The idea is never to be suprised. Everything must be planned for.

For many years the research and development funds were a giant reservoir account which could be reduced to lower expenditures in a recession while expanding manufacturing. The last time this was used was in the early seventies when attrition was also used to reduce the budget. However, sometime in the mid seventies, it is speculated that IBM passed the line where it needed to conserve monies in this manner. The problem now is how to utilize the corporations large sums of monies in a positive manner. In the most recent recession, IBM changed its philosophy and expansion was undertaken in research and development and in manufacturing.

The actual budgeting is done using consolidation accounting. This makes the revenues of the corporation seem smaller than the sum of the individual parts. All accounting is done using two sets of books. The first set of books is in the currency of the country of that particular office. This set of books is generated from an internal point system set up across the whole company. The second set of books relates all foreign country currency into US currency.

The point system is based upon the figures from the sales quota, the two year plan, the product plan, and the country account. Each IBM point is equal to \$1 per month in revenue. All budgets are set using this point system based on the value of country currency related to US dollars.

The entire company uses the same standard forms, layouts, and point system. They are set up so that the required calculations are derived automatically by filling out the forms. Since all managers follow a standard measure of performance, anyone can tell at a glance whether they are in balance properly or not. This creates an automatic decision process and certainly streamlines a managers paperwork. As an interesting side note, World Trade is famous within the corporation for being amazingly accurate with its second year projections. They attribute this to their close customer contacts.

To set up this years' budget first the two year rolling plan is used to tell how much an organization can spend. Then quotas are set by geographical area, down to each salesperson. This is a bottom up process. Its outputs are the number of points of growth yearly from net installed revenue increase (NIRI) and net sales revenue (NSR).

Then Sales planning and forecasts are prepared. Each organization reports how much it expects to bring in on a product by product basis with complete contingency plans for every concievable disaster. (It has been reported

that IBM's paranoia is so complete about not wanting to have surprises that the list of disasters is almost ludicrous. However, in the event of any of these disasters, and they do happen, IBM has always been quick to react and has shown that their disaster planning works for them.) In this two year rolling plan they have no country by country breakdowns. There are only numbers and product descriptions on a function by function basis such as manufacturing, engineering, or personnel. No customer is counted before there is actually a signature.

Policies and Values

The advertised policies are:

1. Good pay and benefits
2. Equal opportunity employment
3. Employees are not laid off for lack of work
4. A large number of working 2 way communications channels
5. This company keeps all its promises

The advertised values are:

1. Do every job well
2. Treat all people with dignity and respect
3. Appear neatly dressed
4. Be eternally optimistic
5. Be clean and forthright
6. Be loyal

Communications

All job changes are announced publically either through bulletin boards or local publications. The wording of a job change is watched carefully. When a person is promoted the wording clearly states 'promoted' or 'elevated'. However a lateral move is usually signalled by 'transferred', 'accepted a staff assignment', or 'has been appointed'.

Downward Communications

There are strict bulletin board policies. This is the company's direct channel to their employees. There are no want ads or club announcements. There are controlled publications for that purpose. All domestic employees receive THINK magazine which has articles about new and interesting job happenings. World Trade receives IBM NEWS which is the THINK counterpart. Many local facilities have their own local publications about happenings. There are also many technical publications. The IBM SYSTEMS JOURNAL is probably the most famous. There is also MANAGEMENT BRIEFING for domestic managers, and DIALOGUE for World Trade management. OUTLOOK is a paper for international English speaking employees. Finally there are video taped presentations on anything that a uniform message is required. These are usually very professional, Madison Avenue, in their approach.

Upward Communications

There are four basic methods of upward communications, i.e., from the employee to the corporation. The most famous is the Open Door. An Employee is right unless proven otherwise. This usually involves an employee disagreeing with their first line manager. However there have been 'Dear Tom' letters which are sent straight to the president. Customers also use the 'Dear Tom' route. This method always gets results. From time to time it causes a lot of management unrest. However, when a manager cannot get anything done otherwise they have been known to encourage an employee to use the open door for the good of the group.

Speak-Up is a written policy communication. Each employee has the right to get a response on a question or complaint about the policies of the company. The writer is protected by personnel. There is a publicized average of 1200/month.

Suggestions carry a reward. A good suggestion that saves the company money qualifies that employee for an award of 10% of the savings for the first year. There is a publicized average of 14000 per month. Finally there is the opinion survey. This is a system of systematic interviews which feed back to first line management on styles, culture, mythology, fashions, etc. Each manager discusses the results with her group and compares then with the company's results oversll. Most findings in the first surveys were negative. However, they have improved over time as employee confidence has risen.

IBM is always trying to improve its relations with the employee. In Europe there was a project named HEAR that was a one time success. It was designed to hear what employees thought about policy. Were they meeting national and individual needs? It started with an intensive training course followed by 2 weeks of interviews of 7% of the population followed by 2 weeks of summaries. No one talked to their own group. The weakness of the study is that middle management was completely by passed. IBM does not feel that it is their best interests to by pass anyone.

V. ENVIRONMENT — Technical

Technology

IBM has had many projects and much time to perfect its methods. Its methodology is applied to all phases of the corporation. Using their software methodology as an example is very telling as IBM believes that software costs will be 95% of the system development costs by 1985. They created a software engineering training program for Federal systems division which consists of ongoing research in the state-of-the art in software development, an organized training program which runs about 26 days from start to finish, a specific set of procedures and tools to support the software engineer in the working environment, a specific set of management procedures for all activities, and an assessment methodology to measure the effectiveness of the program and also to assure conformance. What stands out is the depth of detail in the program. The workers are guided through a uniform set of standards and procedures using the same technology and measures. The difficulty of such a program is rigidity. IBM feels that they get around this by specifying the structure and not the content.

IBM believes that their track record proves that they are correct in being so specific. A short look at the Federal Systems Division track record is very interesting. FSD supported the NASA space program in the 70's with approximately 7000 person-hours of software development, developing and integrating over 100 million bytes of program and data for ground and space processors in more than a dozen projects. There were few late or overrun deliveries in that decade, and none at all after 1976. On another FSD undertaking called LAMPS for the Navy in a 4 year project containing over 200 person years effort with over 3 million new words of program development and over 7 million words of program and data for 8 processors in 45 incremental deliveries, every one of those deliveries was on time and under budget.

Harlan Mills describes software as 'redefined from its usual meanings to mean a logical doctrine for the harmonious cooperation of a system of people and machines - usually many kinds of people and many kinds of machines. In such a system, the agents of action are people and machines, with the blueprints for their action supplied by the software. A human procedure is as important as a machine procedure. People have radically different instruction sets than machines, including an operation called, use your common sense, but they have instruction sets just the same. The synchronization of 2 people, or a person and a machine is as important as the synchronization of 2 machines.' 'Intellectual control is the key to orderly software development'. This is made possible by standard practices. 'Quality must be built into designs and cannot be inspected in or tested in. However inspections and tests can verify quality. The very fact that designs face inspections motivates even the most conscientious designers to greater care, deeper simplicities, and more precision in their work.'

IBM believes that to meet cost/schedule commitments based upon imperfect

estimation techniques, a manager must adopt and manage the design to the cost/schedule process. This requires continuous and relentless rectification of design objectives with the cost schedule. There are two parts to making an estimate, making a good estimate and making the estimate good. This is the problem of management.

To show just how far this discipline goes, IBM also applied the same procedures for the definition and building of the Santa Teresa Laboratory in San Jose, California. There were detailed specific criteria for all issues involved until the final design emerged. Because human considerations were part of the problem solving cycle, a creative design emerged. The same process was again followed to specify the implementation of the project which in this case was the actual building and populating of the laboratory.

All literature perused in the technical areas showed the same discipline. IBM freely publishes it and teaches it to anyone who cares to look for it. What is so amazing about the discipline is the depth of detail to which issues are documented for possible problems. What makes IBM different is that they are not eternally optimistic. They expect problems to arise in the process of development and plan for it. There are no to be no surprises. Success is better than optimism.

Manufacturing

Manufacturing is considered second to sales in priority. Factory workers are kept happy. The company has a great fear of unions. They fear anything that would control them from the outside. Therefore, they pay a higher than average salary, and provide good benefits to all employees. They work hard to create a team attitude.

The manufacturing plants are all small factories scattered across the countryside in various locations convenient to cities and engineering labs. Each is an independent entity free to make engineering changes inside the product as long as the corporation is kept informed through well specified channels.

Recently DEC employees were given a tour of IBM manufacturing plant. They saw many modern processes. IBM manufactures some parts that there was no other source for anywhere in the world. They have total traceability via a card reader sensed system from the employee badges for all products. This system was designed and built by IBM.

The following is a paraphrase of the comments of their impressions. The quality emphasis is corporate-wide. It involves everyone. The theology is from Crosby who trained the beginning group. Currently everyone in a plant is a member of a quality team. Everyone has been to a quality course. There are control charts, motivational messages and descriptions of solutions everywhere. The emphasis is excellent results using 100% participation. There is a daily defect report and a weekly customer poll on performance. Persistent problems are attacked by factory personnel.

The record retention of all the manufacturing steps allows total traceability. 'I am absolutely convinced that the quality attitude, defect analysis, and machine-based repeatability guarantee that the quality and reliability are substantially better than ours' (Bill Green).

Research and Development

Marketing is done on a national basis. Manufacturing is done on a continental basis. Research and development is done on a global basis. The goals are profit achievement. Technical achievement is only a goal when it is necessary for profit achievement and as a cushion to absorb money.

Most locations are chosen for political and personal reasons. They are usually close to the major marketplaces. The pure research is mostly done in Yorktown Heights, N.Y., San Jose, Calif., and Zurich, Switzerland. The rest of the facilities do mostly applied research development at the product level. They are trying to make the principles work at a reasonable cost in marketable products.

The research groups really took off in the times of Tom Watson, Jr. He wanted tough entrepreneurial people who were not afraid to put their jobs on the line to get a policy changed or push for new activities. This is still encouraged within the corporation. However, it would be interesting to find out if the people are willing to risk giving up IBM for a principle currently since the culture encourages them to stay within the confines of the system.

Each lab has a particular mission. It coordinates all the technical activities for a product or product range world wide. Most important is controlling the product. No plant can make a change without coordinating it through the laboratory for control. This works because of the one world product line policy established by Tom Watson, Jr. and automated communications. To understand the difference between a mission and control; understand the difference between development and production.

Since IBM owns all work developed by an employee during the time that employee works for the company, moonlight systems are encouraged. They feel it increases internal competition and brings new ideas to light. Brute force research, parallel development and parallel marketing (for only short times) are used to develop products. It is estimated that 1::80 products reach the marketplace. Entire product lines are expected every few years. The risk is that they will become their own biggest competitor if the differences between the new and old line are too transparent. This almost happened in the 360 to 370 transitions. This is a problem because compatibility is assured. There is evidence that IBM delays announcements of computer improvements until competitors threaten to gain the market or until competitors set up the market for their entry, or until their users demand compliance.

Development Cycle

1. Phase 1 - Requirements and specifications - parcelled formally to a lab with a budget.
2. Phase 2 - Design
3. Phase 3 - Prototype - earliest announcements have been known to happen here.
4. A Test - Prototype testing
5. Phase 4 - Production type machine
6. B Test - Reliability and performance
7. Phase 5 - Build and test first production models.
8. C Test - First customer delivery and test.
9. Control now passes from development to the Laboratory for Control for production, maintenance and retirement.

Summary

Lessons from IBM

What is amazing about IBM is the wholistic approach that they take to their culture. They are a computer company that has not forgotten the first rule of all, computers are made by people for people. They take good care of their customers and their employees. These two elements of their culture seem to be the secret of this corporation's great success. It is remarkable to find a company takes such responsibility for its people (both employees and customers). There seems to be a special awareness about the leaders and heroes of IBM. This awareness is a strong personality that is very opinionated about what is good business. The fact is that they have been right about themselves for a long time. This stems from the charismatic beginnings of Tom Watson Sr. who had such definite ideas about things. So did his sons. The people who they hired to follow them are in that image. This ability to look at oneself in a corporation helps maintain their first two values. The complexity of planning and feedback systems brings them a special power to remain flexible and yet still maintain their homeostasis as a vibrant system of living beings. IBM does its homework well.

A company like IBM is good at hiding its underbelly. Speculations can be made however. Can they continue to keep the values and training current enough to maintain their homogenous culture? Now that they are selling outright and not leasing, can they still keep on top of their customers as well? Can they still manage to operate with such success in so many national political climates simultaneously? Will they stay up in the technology race? Is the move to do research with Japan going to work out well or will Japan beat them at their own game? There are a lot of similarities between the IBM and Japanese cultures that need to be explored.

Lessons for Digital

What lessons can be learned here? The ability to make informed decisions depends upon the willingness to look at oneself and to take responsibility for what is and to develop a plan for what is wanted. First, looking at oneself includes finding out what works in the DEC environment, not necessarily copying the IBM environment. The IBM environment is very different from DEC. This will be further elucidated in later studies already planned.

Once we know what DEC is, we can begin to ask the same questions that we asked about IBM. How are employees handled? Are they made to feel their value to the continuance of the corporation? Are customers given excellent service 99.5% of the time? Do we know what kind of service our customers are getting? What kind of planning mechanisms are in place to give the

long range view? How does the company maintain its power and flexibility? Most of all, how does the system fit together? DEC is a powerful company in the marketplace. The answers needed to keep growing in a positive evolutionary manner are all within the system. The trick is in being willing to look at the system, knowing what to look at, and most of all the willingness to change what is not working creatively. The excellent staff and history of quality work has provided the base of a company that has its own personality. What is needed now is the ability to gather the DEC information together and create painless evolutions toward the desired goals. What the IBM study has provided is good information about the decisions that are made. It is hoped that when an interface with this company is contemplated in the future, that this study will provide some of the background for handling these interfaces with this corporation. Additionally, IBM has been so creative, their solutions can be used as beginning places in the areas where it has been decided that something else should be tried. Finally, when all the research in this project is published, it is hoped that the commonalities of successful computing businesses can be uncovered.

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