ANALYSIS OF THE EXPERIENCE AND STABILITY PROJECT AT FORD MOTOR COMPANY – WHAT DOES IT TAKE TO CHANGE A CULTURE AND REBUILD A TECHNICAL ORGANIZATION?

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Abstract

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As Ford Motor Company celebrates its 100th anniversary; it finds itself in a crisis due to its lack of technical proficiency. The lack of technical depth within the workforce is the result of a deeply ingrained culture that encourages employees to change positions every 18-24 months to vastly diverse parts of the company. The problem is exacerbated by years of early retirements, company sell-offs and outsourcing of technical design work to full service suppliers. In reaction to the lack of technical competency, Ford has undergone one of the largest reorganizations in their history. The new organization is now centered on function with loose ties back to the many vehicle programs. In order to encourage a new corporate culture that values technical depth over being a generalist, Ford has also developed additional projects within the organization. One of the most prominent is the Employee Stability Project (ESP) and Technical Maturity Model (TMM) that focus in on developing a technical development plan for each individual engineer.

This research analyzes the rollout of the ESP/TMM project within the Body Engineering function (with some comparisons to the Chassis Organization). Data was collected through two surveys conducted nine months apart and focus group sessions. The surveys encompassed the entire Body Engineering organization. In addition, the culture at Ford was compared with the culture developed at one of its main rivals, Toyota. The data for Toyota was collected through one-on-one interviews.

The result of the data collected show that entire workforce recognizes that the lack of technical depth within the company is an issue. In addition, the concepts and principles behind the ESP/TMM project are understood and deemed important to the company's success. However, there is still resistance to the adoption of the project and momentum behind the support

of the ESP/TMM project appears to be stalling. The recommendations by the authors include reinforcing communication, recognition, and demonstration of appropriate technical behaviors at every level within the organization. Ford should also utilize the technical depth within the company (in the form of senior engineers and technical specialists) upfront in the development in new programs and as consultants at key technical milestones to maximize their effectiveness and teaching opportunities. There are also several recommendations around the Individual Technical Development Plan in order to encourage its adoption and ensure its usefulness to the technical development of the engineers. Finally, a vision of a fully functioning, highly technical organization is described to show how this organization can quickly adapt to future challenges that the company may face.

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Chapter 1

INTRODUCTION

The turn of the century saw Ford Motor Company quickly approaching its one hundred year anniversary. However, the company that arguably had the largest impact of any organization on industry and the American economy and culture during the last century was facing difficult times in the new one. Ford had seen its past few programs launched with less than stellar performances. While sales remained strong, rising program costs, delays in launch schedules, declining quality and customer satisfaction numbers pointed to tough times ahead. In assessing the situation, management came to the disturbing conclusion that the highly technical automotive company had a workforce that very little technical depth.

Within the deeply ingrained culture at Ford Motor Company, employees had come to expect a new position every 18-24 months. This was due, in large part to Ford 2000. The goal of the Ford 2000 reorganization was to create a centralized, global engineering staff that is matrixed to vehicle programs. Ford 2000's vision was to create program teams focused on the customer. The technical development of non-core commodities was outsourced to suppliers. Within the Ford 2000 environment, the business aspects of a program often overshadowed the technical solutions to problems since the business aspects were more readily understood. Instead of encouraging employees to become technically deep, the company encouraged employees to become "mini-CEOs" and focus in on understanding the financials of the business. Thus, in recent history, the company had rewarded employees who moved around the company to get a

breadth of different experiences rather than remained in the same job. Because of the virtues extolled by Ford 2000, employees who performed the same job for more than 18-24 months began to feel that their career had stalled if they did not move. Combined with the proliferation of early retirements and buy-outs, outsourcing of technical engineering work and selling off portions of the company, the technical proficiency in many areas of the company quickly eroded.

In response to this problem, Ford went through another substantial reorganization in 2001. This new organization switched its focus back on the core functional areas that Ford has recognized for years while still maintaining light ties to the programs. In addition to the reorganization, Ford Motor Company hopes to make significant change in the culture within the company. Technical depth should be more highly valued than general company breadth. Employee movement should be dramatically reduced as engineers gain the experience and training to hone their skills to become highly proficient in key technical areas within the company. The solutions to technical issues should carry the same importance as the business details that were so highly stressed in the previous organizations. Ford is currently implementing the Employee Stability Project (ESP) and Technical Maturity Model (TMM) in an attempt to address the lack of technical depth and change the corporate culture.

In the next chapter, we outline the organizational and cultural history over the past 13 years to present. We then discuss the ESP project and its roll out in depth. Research and data include online surveys to the entire population affect by the ESP that were conducted in December 2002 and August 2003. We also conducted focus groups at three different levels in the organization to obtain qualitative information on the ESP project. Furthermore, we conducted one on one interviews with former Toyota employees who now work at Ford in order to

gain insight on how Toyota develops technical depth in its engineers. The presentation of the data is followed by an in-depth analysis and theory on the results of the surveys, focus groups and interviews.

The final chapters include observations, recommendations and conclusions. The lack of technical knowledge is recognized throughout the company. It is seen as a key contributor to recent quality, timing, financial, and warranty issues that have occurred on several recent programs within the company. Almost everyone also felt that the ideas and principles behind the ESP/TMM were strong and if instituted, would point the company in the right direction. But many are still skeptical of Ford's dedication to the ESP/TMM project. As in most large corporations, the workforce is very cynical. They are loath to fully subscribe to something that might turn out to be the 'flavor of the month'. Our recommendations focus on the execution of principles based on organizational behavior and learning theory.

One of the major dimensions of the ESP efforts has been the creation of the Senior Engineer position; however, it has been met with mixed results. Generally, engineers have all said that the correct people were chosen for these positions. However, it seems that there is no clearly defined role for the Senior Engineer. The supervisors and engineers to whom we spoke felt that the Senior Engineers were under utilized. We recommend that the Senior Engineers focus on programs early in the development phase, where most of the critical decisions are made. Another important role for the Senior Engineers might be as consultants near key technical milestones. With the amount of technical depth within the company now such a scare commodity, the real key is to focus all of the technical expertise that the company does possess in areas where it will have the greatest impact.

We conclude the thesis with our vision for the future. We recommend a slight change to the organizational structure. Ford could maintain the functional organizations. However, we feel that supervisors and their engineers within these organizations could be assigned to specific programs. This would allow them to develop a relationship with a particular vehicle program and customer while maintaining a functional focus. We also recommend that less experienced engineers begin their careers on smaller programs from the middle of the development phase through launch. More experienced engineers would staff larger, more complex programs at the beginning of the development phase and ideally, the entire way through launch. If the adoption of the ESP program is successful, Ford will eventually grow a highly technical proficient organization. Once this occurs, the organization has a lot of flexibility to continually gain depth and focus on skills that will aid in the challenges that they will face in the future.

As employees of Ford Motor Company and members of the Body Engineering organization, we feel that the lack of technical proficiency throughout the company is one of the most critical challenges the company is facing. Viewing Ford as a large technical system, one of the key system constraints is that the current technical skill level is inadequate as a whole, and varies widely from individual to individual. The rebuilding of the what has been lost – the development of the desired technical capability across such a large and diverse workforce will take an incredible amount resources, time and effort. With relatively long product development cycles and even longer product use cycles, the results to the company's bottom line are many years off. Ford Motor Company must remain patient in this timeframe and continue its strong support of programs like ESP/TMM. The best part about the difficulties of changing the culture in a large, complex organization is that once a positive one is established it will reap benefits for a long, long time.

Chapter 2

CURRENT ORGANIZATIONAL STATE AT FORD MOTOR COMPANY

Current State of the Company

Ford Motor Company is the world's second largest industrial corporation and just celebrated its centennial anniversary this year. Ford has approximately 335,000 employees in 200 markets on six continents. Its automotive brands include Aston Martin, Ford, Jaguar, Land Rover, Lincoln, Mazda, Mercury and Volvo. Its automotive-related services include Ford Credit, Quality Care and Hertz. The company is divided into two principal activities, the automotive segment, and the financial services segment. The automotive segment deals with the design, manufacture, sale, and service of automobiles and automotive components. The financial services segment deals with the financing, leasing, and insurance of automobiles as well as the leasing and renting of cars and trucks. The automotive segment brought in 83% of the revenue for 2000, while the financial segment brought in the remaining 17%. The automotive industry is a very mature market with intense competition and razor thin margins. Although Ford generated revenues totaling $162.6 billion in 2002 (compared to revenues of $162.4 billion in 2000 and 2001 respectively), they only earned $872 million in profit. This is after the boom of $6.67 billion profit in 2000 and the bust of a loss of $5.45 billion in 2001.

These numbers illustrate that Ford is going through tough times right now; trying to maintain its leadership in the automotive industry. Ford's North American vehicle sales and revenue dropped about 11% in 2001. Furthermore, Ford North America lost $2.15 billion in 2001 compared to earnings of $5.03

billion in 2000. In order to reduce costs immediately, Ford suspended paid overtime in early to mid 2001, drastically reduced business travel, and suspended purchases of office supplies. In January 2002, they suspended 401K matching, and they cut 5,000 jobs in the fall via early retirement packages. For 2002, revenue remained flat and sales dipped slightly. Still facing stiff competition, 2003 brought more of the same pressures. Ford announced another round of job eliminations earlier this year and cost cutting remains a key priority.

Company Culture

Ford is an enormous organization with a storied past. Ford has been a key competitor in the automotive industry and has gone through very successful times and very bad times in their sector. This gives Ford employees a feeling of pride in the accomplishments of the company and creates a tone of camaraderie for the workforce for having struggled through the bad times together. Ford has a "family" type atmosphere. The employees identify deeply with the products that they design and build. Everyone knows someone who drives a Ford and has an opinion on Ford cars and trucks. When things are going well, everyone feels good about their work. When things aren't going well, the employees often take it personally. Of course, in a company that has been around for one hundred years, the culture is very entrenched. The culture is slowly evolving but influence from the past is still very evident.

Since Ford is a product driven company, the engineering organization has the most influence and power over their products. The goal is to deliver a manufactured product that meets all technical requirements. However, cost and timing pressures are very evident today. This puts stress on employees to perform in an understaffed environment created by Ford's financial and business troubles. Employees that are "fire fighters" or are willing to put in the extra time are the ones recognized and rewarded. In the past decade or so, employees have also been rewarded for moving around and gaining a breadth of experiences

across Ford Motor Company. The only people who were promoted to management roles were people who had 'punched their ticket' in several different functions. There was no clear technical career path. After progressing through the general salary role ranks, an engineer not slated for management remains a salary grade '8 for life'. Salary grade 8 is the highest non-managerial engineering position and, as with most companies, if an employee doesn't reach a management position by a certain point in their career, it is unlikely that they will be promoted above a salary grade 8. We will discuss how Ford 2000 and the previous organizational structure might have influenced this culture in the next chapter.

Classic (functional-based) Organization – the Sloan Model

Since being established in 1903, Ford Motor Company had seen a variety of organizational structures throughout its history. The organization throughout much of its early years and the phenomenal growth of the Model T resembled a factory with a small number of people (Henry Ford and his immediate advisors) making nearly all of the key business decisions. The rapid growth internationally of Model T set up independent manufacturing and distribution centers for Ford vehicles in almost every country or region where the Ford had a market presence. The impact of that strategy is still somewhat evident today, over one hundred years later.

Copying the model established by GM's Alfred Sloan, Ford switched to a highly functional organization throughout most of the later half of the twentieth century. This classic organizational structure became deeply rooted in the organizational culture of the company. The main feature of the organization is that functional groups such as chassis, body, and powertrain were extremely dominant. Specific vehicle lines were managed at very high levels with little project management done at the lower levels in the organization. As a result there was little communication between the functional groups and there was

constant maneuvering for greater positions of power for a particular functional group with respect to the company as a whole. Vehicles were championed by a particular "vehicle czar" that was a high-level executive who ultimately had enough power to get the various functional groups to cooperate. In addition, Ford's worldwide operations were extremely fragmented with each region developing vehicles, often with similar specifications and customer requirements, independently of one another. Technical knowledge was also infrequently shared between regions and types of vehicles. This resulted in Ford Motor Company essentially having a duplication of efforts throughout the company. Often, mistakes were repeated from program to program and there was very little communization of processes. The financial impact of the duplication of efforts, delays in programs and warranty costs was very significant.

Despite these apparent drawbacks, this organization did develop deep-rooted technical expertise within the functional groups. Engineers were hired in to a particular functional organization for a particular type of vehicle (commercial trucks, pickup trucks, passenger cars, etc.) where they would likely spend most of their career. Engineers then were put through an informal apprenticeship for their first few years with the company. An initial assignment would be to design and develop smaller parts that would have a small impact on the success of the vehicle program. The young engineer would also work with and near a group of engineers that had a lot of experience designing similar parts on many other vehicle lines. In addition, the leader of the group would be a senior engineer. This senior engineer would be in a management position and preside primarily over the technical aspects for his section. In addition to the senior engineer, there was also a program management supervisor that might have responsibilities for several sections. This program management supervisor would be the link to the particular vehicle programs and would be concerned with product timing and costs. The program management supervisor handled nearly all of these details personally and the individual engineer rarely attended vehicle specific meetings.

Upper-level management at Ford made several attempts in the 1980s and 1990s to reduce the fragmentation of their worldwide operations and increase the communication both between and amongst the functional organizations. They met with little success. The first major program to combine the operations of Europe and North America was the Ford Escort. The vehicle began as a joint effort between both continents in the early 1980s. Perhaps the company tried to start with too complicated of program by attempting to bridge both international and functional boundaries with their first attempt. By the time the vehicle was released in Europe and North America, it was said to only share about 10 parts.

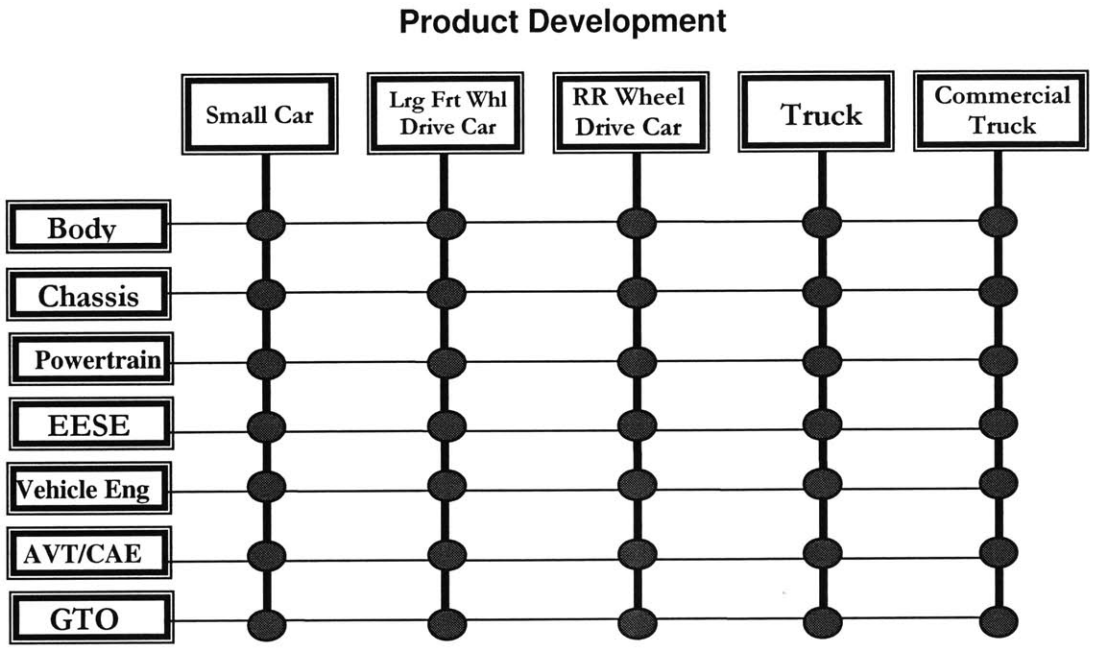
After seeing the success that Toyota enjoyed in the decade by selling nearly 1.4 million Corollas around the world with very small differences for individual regions, Ford tried again to develop a world car in the late 1980s. The CW27 platform was to produce a midsize sedan for both Europe (Ford Mondeo) and North America (Ford Contour and Mercury Mystique). The estimated sales volume was to top 800,000 with a three and half year development time and a budget of $4 billion. After five and a half years of development and over $6 billion invested, the vehicles were finally released to the public. The Ford Contour and Mercury Mystique both were disappointments in the North American markets and only the Mondeo approached its sales goal. The vehicle was still primarily developed in Europe with the focus on the European customer. The Contour and Mystique faced the problems of a customer that did not care about driving dynamics and vehicle performance as much as his European counterpart did. The North American customer cared more about value and vehicle package. The Contour and Mystique were priced quite close to their larger cousins, the Taurus and the Sable. And with inadequate marketing to explain the difference between the European styling and handling, the sales of the Contour and Mystique were rather disappointing. Today the Contour and Mystique are discontinued models in North America, while the Mondeo has expanded into several different body styles in Europe.

Ford 2000 Organization – Product Focus

Alex Trotman was hired as Ford's first foreign-born CEO in 1993. At the time Ford Motor Company was enjoying some its best financial success in its long history. Although Ford was losing some market share in both Europe and North America, profits were up and Ford had half of the 10 best selling vehicle in North America. After originally promising to keep to the status quo, a year later Trotman announced a historical reorganizational effort that would affect the entire company. Trotman dubbed the plan Ford 2000 and the goals of far-reaching plan were to break down the functional chimneys that had developed over the previous half century and eliminate much of the duplication of effort between Europe and North America. The details of Ford 2000 were communicated to top-level managers starting in the summer of 1994 and the new organization was officially rolled out January 1, 1995.

The new organization was centered around 5 vehicle centers (VCs): small front wheel drive cars in Europe and commercial trucks, personal use trucks, rear wheel drive cars and large front wheel drive cars in North America. Its respective VC wholly owned the product development of each vehicle line so there was no duplication of effort across continents. Within each VC a matrix organization was established with nearly all employees reporting to both a functional and program Chief Engineer. Over a short time frame, the programs became much more powerful than the functional organization. This was in many ways deliberate. Trotman wanted employees to connect more closely with the customer. In order to do this, the decision was made to have engineers assigned to specific programs and be collocated with other engineers on the program rather than with engineers performing the same function on a different program. As a result, the vehicle program and its management dominated the attention of the engineer, and there was relatively little exposure to the functional management.

Under Ford 2000, technical employees were placed in a radically different environment than in the previous organization. Most new employees were hired into the Ford College Graduate (FCG) program. During this two year initial program, an FCG would have four to six rotational assignments in nearly any area of the company of their choosing (including non-technical assignments. After the program, the FCG would be placed on a vehicle program within the functional organization that hired the FCG or the FCG would find her own position using the network she had built up over the last two years. Once on a program, an engineer would be placed in a program module team (PMT). The PMT section would consist of engineers that were all part of the same functional group assigned to a particular vehicle program. The PMT supervisor would be in charge of both the technical and program management issues for the section. The PMT supervisor would report to a manager that was in charge of the entire function for that particular vehicle line. This manager would report directly to a functional manager in charge of the function for the entire VC and would report via a "dotted-line" relationship to a chief engineer in charge of the vehicle. Since the "dotted-line" relationship was more important for day-to-day activities, it soon grew to be much more important than the functional relationship.



Each function has a Chief Engineer and a manager from each function assigned to each program. This manager and his people report to the Functional Chief Engineer and are dotted line to the Chief Program Engineer. However, the reporting relationship to the program was stronger than the functional tie as the Chief Program Engineer actually owned the headcount for his/her program.

Figure 1. The Product Development Organization after Ford 2000

The new organization and the changing of the power structure quickly changed the corporate culture dramatically. Since an employee was now more exposed and had a stronger network within a particular vehicle line, he was more likely to get a new position or promotion on that same vehicle rather than within the same function. It soon became common practice for engineers to change to positions in very different areas within a functional group and also between different functional groups. At the same time, Ford's promotional practices emphasized rewarding the "fast-risers." People were recognized for doing a lot of varied assignments in a short period of time. There soon became an unwritten rule that if an engineer was on the same assignment for more than two years, it was a sign that her career was stagnating. Supervisor and managers encouraged this movement and it quickly became institutionalized. Upper management also continued to stress not only getting closer and closer to the customer, but for employees to develop their business acumen and to treat their jobs as a "mini-

CEO." By changing to several positions within a program, the engineer got the opportunity to see the program and the customer from several different angles. A "mini-CEO" was often recognized more for his ability to program manage and meet program cost and timing than for the ability to develop technical solutions to engineering problems.

By the turn of the century, Ford 2000 had completely taken hold of the corporation. There was little remaining of the previous organization. It is important to note, that Ford enjoyed their most profitable years in their storied history throughout the nineties. Much of Trotman's goals for Ford 2000 had come to fruition. The three (commercial trucks had been sold off and large rear wheel drive and large front wheel drive vehicle centers had merged into one) vehicle centers were the focus of the organization. The workforce was highly vehicle and customer focused. Product development at a vehicle level did not have a large duplication of effort between Europe and North America. However, the functional organizations within the vehicle centers were almost non-existent. There was little functional knowledge sharing between vehicle lines and almost none across vehicle centers. The lines of communication simply did not exist. As a result, Ford often saw a complete redesign of vehicle systems on each new vehicle. The original vision of a few vehicle platforms throughout the company had also not come to fruition as each vehicle was specifically tailored for its customer with little communication between other vehicle lines. In addition, engineers with extensive functional experience within a single functional position were extremely rare. As a result, early in the twenty-first century, Ford started to see both warranty and customer satisfaction data started to flatten out and even decline after steadily improving from the late eighties onward.

Other Organizational and Factors that helped shape Ford in the 1990s

The nineties also saw the culture of Ford Motor Company shaped by many other factors. Ford, like nearly all of is competitors, turned to outsourcing

as a way to control their development timing and costs. Ford determined that transmissions, engines, and body structures were the core competencies of the company. They increasingly started to outsource other areas of the vehicle to full service suppliers. The original strategy with full service suppliers (FSS) was to allow the FSS to design and engineer the commodity nearly entirely on their own. The Ford FSS liaison would be in charge of managing the FSS in terms of program requirements, schedule and cost. In many cases, this liaison would be an engineer without a deep functional background in the commodity that he/she was managing. This was not seen as a priority since a FSS contract stated that the FSS was in charge of the engineering of the commodity. This led to several problems, as FSS's became the normal way of doing business. First, the FSS was primarily concerned with the business success of their own company and would understandably work in their own best interest. Ford, in many cases, exacerbated the situation, by often setting up an adversarial relationship with the FSS (usually over financial considerations). Secondly, in many cases, FSS had just entered into an environment where they were responsible for all of the technical aspects of a commodity. They often had an engineering base that had as little of technical experience as the Ford liaison that they were working with. As the FSS worked on more and more programs at Ford and other manufactures, they did start to develop more functional expertise. However, since the Ford liaison was rarely the same throughout a single program, let alone across many programs, this functional expertise was rarely passed on to Ford.

The nineties also saw the aggressive trend of corporation downsizing. Ford Motor Company was no exception. The decade saw a steady stream of corporate buy-outs and early retirements handed out to Ford employees. Not surprisingly the focus of these buy-outs were lower-level employees that had spent most of their careers in the old organization. Many of these employees preferred to stay within the functional organization where their career had been developed. Under the new corporate culture, this decision seemed to indicate

that their career had stagnated and they were not prime candidates for promotion or career advancement. After a decade of this process, few low-level engineers from pre-Ford 2000 remained and even more of the company's functional depth had been removed from the organization.

Finally, in a continuation of corporate downsizing and outsourcing, Ford sold off many aspects of their business that were not considered core to their fundamental role of vehicle manufacturer. The principal sell-off was all remaining non-core engineering functions that were not already out-sourced. Following GM's example with Delphi, Ford created and then spun-off Visteon. Visteon contained all engineering not related to engines, transmissions, and body structures. The idea was for Visteon to remain a preferred supplier to Ford while allowing Visteon to seek FSS relationships with other companies and Ford to focus on their core competencies.

After spinning off Visteon, Ford relied on full-service suppliers to do the engineering work not part of the core competencies mentioned above. Initially this decision proved to be very profitable. However, this business decision quickly proved to be more demanding and challenging than Ford realized. The full service suppliers, understandably, were extremely interested in their own company's welfare and profitably. When situations arose where the best interests of the full service supplier were at odds with Ford's, the full service suppliers obviously leaned towards making the decision to benefit themselves. Ford thought it could handle the relationship with the full service supplier with engineers with limited experience in the details of the particular commodity. Ford engineer would act as a program manager and a liaison between the FSS and Ford. However, Ford made a miscalculation in this regard. It was assumed that these commodities were very well understood and all of their interfaces to the rest of the systems in the vehicle were clearly identified and understood. This was not always the case. In addition, the full service suppliers also had engineers

that did not all have a deep-rooted technical background in the commodity and it takes some level of technical competence on the Ford engineer's part to recognize this lack of depth. A deep technical understanding was also required by the Ford engineer to evaluate the decisions made by the FSS. This knowledge was required to provide technical support to the FSS, determine feasibility and robustness of designs, and to evaluate the financials of the FSS services. In other words, a technical background in the appropriate functional area was necessary to protect Ford's best interests. Ford assumed that this technical knowledge was a commodity that was easy to obtain and use when necessary. Experience has shown that this is not the case.

Current Organization – Functional Focus

In the wake of the atmosphere described above, Ford Motor Company went through another major reorganization in 2001. The purpose of the reorganization was to get more focus on technical competence in the wake of rising costs and quality problems. However, the company recognized that the identification on the employees with products and customers had a lot of value. In addition, they wanted to prevent situations where there were power struggles between the functional organizations like what they saw in the pre-Ford 2000 era.

The new organization, like the previous one, is a matrix organization. However, in the new organization, the functional ties are meant to be more direct and powerful than the product or program ones. Engineers reported directly to a functional supervisor. Depending on the organization, this functional supervisor can be in charge of a particular function for a particular vehicle program (for example, the functional supervisor can be in charge of body structures for the Explorer program) or she can be in charge of a particular function for one of the five vehicle groups (for example she could be in charge of locks and mechanism for all Ford SUVs. The engineers underneath the supervisor might either be in charge of all the locks and mechanisms for a particular SUV program or be in

charge of a single commodity (like door mechanisms) for the whole SUV line-up). Typically, a supervisor will have between three and six engineers reporting to her. The organizational layout decision is left up to the particular functional manager. The functional manger has between three and eight functional supervisors reporting to her. Finally, there is a chief functional engineer that has all of the functional managers for a particular commodity (body, chassis, powertrain, etc) reporting to him for one of the five vehicle groups. A majority of the engineering function falls within this organizational structure. It is commonly referred to as the backbone or spine. The purpose of the spine is to pull together all of the engineers that perform similar technical functions under the same management. The idea is to quickly communicate and share ideas within this community.

The chief functional engineers also have supervisors reporting to them that act as a liaison to all of the vehicle programs within their functional organization. These supervisors are referred to as program management team (PMT) supervisors. It is their responsibility to communicate the needs of the vehicle programs back to the engineers in the backbone. While the backbone supervisor is in charge of the technical details, the PMT leader is responsible for the cost, weight, timing and other program management details of the designs. Often a PMT supervisor will have a small number of engineers reporting to him to aid in these program management activities.

The programs still maintain a chief engineer in charge of the program, now referred to as the Chief Nameplate Engineer (CNE). However, all of the engineering work is essentially "farmed out" to the backbone. Thus, the role of the CNE is predominantly to manage the business aspects of the vehicle program and managing trade-offs between the different functions (body, chassis, powertrain, etc). During critical times of the program, these program chiefs have to work with the functional chiefs to ensure there are enough human resources

available to support all of the work required by the programs within the vehicle center. Each vehicle center also has a director. Reporting to this director is the functional engineering director who has all of the chief functional engineers reporting to her and the chief program engineers. The vehicle center director ultimately has the responsibility to ensure that the programs for his vehicle center are delivered on time, within budget and with high quality.

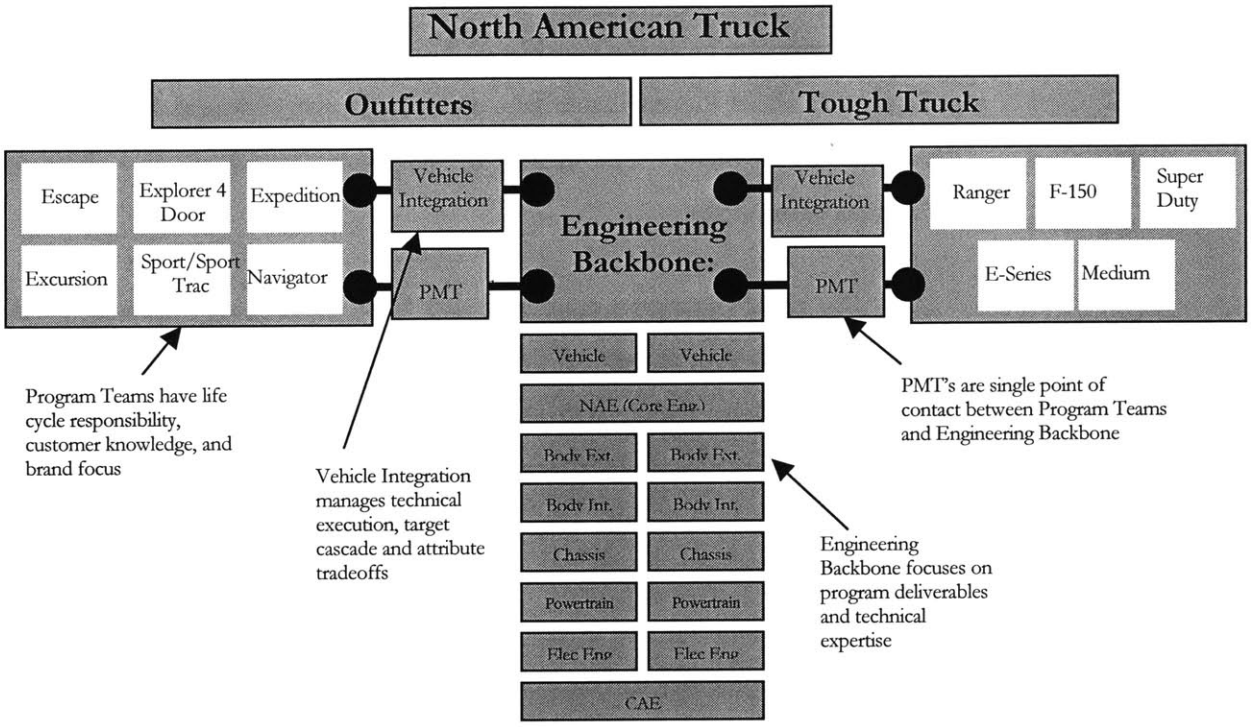


Figure 2. The Product Development Organization after 2001 Re-Org

Comparing this organization to the previous one, the functional groups definitely have a lot more power with a chief functional engineer enjoying an equal amount of power as a chief program engineer. Engineers in general feel more connected with functional groups than with a program, but they still have extensive contact with the programs that they are working with. As may be expected from the above description, there is quite a bit of tension between the

functional organization and the program teams for resources. The program teams are not used to not having direct control of their engineering resources. They must now work with the functional chiefs to ensure that they have enough support for their programs. Trying to balance several different programs, all with their own timing plans and demands is one of the main responsibilities of the chief functional engineer. This most recent reorganization has effectively elevated the functions to the same level of power as the programs. However, due to the impacts of the previous organization, the engineering technical knowledge is not sufficient at this point to make this new structure work. Ford has recognized this and has attempted to address these problems with projects like the Employee Stability Project (ESP) and the Technical Maturity Model (TMM).

Chapter 3

THE ESP AND TMM PROJECT

Description of ESP and TMM programs

Within the deeply ingrained culture developed at Ford Motor Company, employees have come to expect a new position every 18-24 months. Ford has rewarded employees who move around the company to get a breadth of different experiences. This phenomenon began with the reorganization under the Ford 2000 initiative. While the reorganization only occurred in the mid-1990s, it was quickly adopted by the entire company and had taken deep hold within most individuals. Employees who perform the same job for more than 18-24 months begin to feel that their career has stalled if they do not move. Combined with early retirement plans over the past decade, the result has been an erosion of technical competence within the company.

Although management recognizes this issue, several past attempts to address this issue have not been successful. Ford is currently implementing the Experience and Stability Project (ESP) across different functional organizations to address this problem. In 2002, eight initiatives were identified in Product Development's Business Plan. One of those initiatives was the Experience and Stability of Personnel. In February 2002, a team of Product Development Operations and Human Resource leaders established the ESP Project's governance structure. The work on the ESP Project has centered on three key points:

1) The desire that engineers develop technical depth and expertise in identified competency areas

2) The need to create an infrastructure to value and support the development of engineering expertise and competency

3) Creating practices and processes that will promote a culture consistent with these goals

Action Teams were formed to execute the plans within each function. To focus and align the teams, principles were developed to provide direction and to establish a common vision for their work and recommendations. They are:

- Technical depth and leadership is as important to the Company as managerial leadership
- Elevate the Engineer to a position of respect
- Foster a sense of pride and satisfaction in the Engineer
- Create an environment that offers both psychological and material rewards
- Remove barriers that inhibit Engineers from practicing their profession
- Establish the expectation that technical excellence is a fundamental requirement within PD

The Action Teams were formed to design and develop Technical Maturity Models (TMM) and supporting infrastructure for each functional activity. The TMM design teams were comprised of engineers from a variety of salary grades and leadership levels. The TMM is a tool for PD engineers and technicians that describes expected competencies in key areas. There are 12 different competencies for Body Engineering (see Table 1).

Body Engineering TMM

1. Technology Development – Translates emerging trends into concept ready applications supporting corporate/program needs
2. Requirements/Functions – Demonstrates ability to translate Corporate, regulatory, and customer requirements into Engineering deliverables with knowledge of system capability and limitations of current technology
3. Target Setting/Cascade and Architecture – Identifies and cascades attribute values that meet customer needs and corporate objectives with understanding of system interactions. Knows how architecture constrains functions and impact cost and quality. Makes appropriate architecture selection.
4. System and Component Creation, Integration and Package – Integrates concepts, technologies, and processes into feasible system and component designs that meet program targets, requirements, and package constraints. Identifies tunable system parameters with sufficient range.
5. Design Feasibility and Materials – Translates system designs into feasible-to-manufacture detailed drawings and specifications so the product meets the functional constraints and other program objectives.
6. Development – Selects values and tolerances that meet vehicle performance objectives across the range of expected usage.
7. Quality, Robustness, and Reliability Engineering – Applies robustness and reliability tools and methodologies to achieve a design that meets intended function, that is mistake-free, and robust to the 5 sources of noise, for the useful life of product.
8. Design Verification and Engineering Sign-Off (Design Validation) – Plans, conducts, and analyzes development and verification testing (physical and analytical) with reference to targets and requirements.
9. Product Launch – Understands manufacturing and assembly processes and capabilities to produce the components or system. Specifies design/datum strategy to support efficient, repeatable manufacturing and assembly processes. Integrates design into the production environment.
10. Tools and Methodologies – Understands and uses appropriate tools, methods, processes, and computer systems to accomplish design, development, and release of the product or system.
11. Supplier Management – Provides direction and guidance to suppliers ensuring that their products and services meet technical requirements and program objectives. Leverages the most competent suppliers and builds the capability of the supply base.
12. 6-Sigma – Demonstrates knowledge and application of Six Sigma: Define- Measure-Analyze-Improve-Control (DMAIC) and Design for Six-Sigma: Define-Characterize-Optimize-Verify (DCOV) breakthrough methodologies.

Table 1. Competencies of Body Engineering TMM

The TMM tool is to be used in conjunction with the 'discipline-specific mastery lists' to:

- Self evaluate technical job performance
- Engage in development discussion with supervisors and mentors
- Map personal developmental goals

In respect to the competencies, there are three different levels of proficiency at which engineers can rate themselves; see Figure 3 for definitions.

Proficiency Definitions

Stage I – Acquiring/Novice: Is aware of the skill/task, the basic knowledge concepts, or the process for doing something. Knows who to go to for assistance and information.

- Operate: To control the functioning of a process
- Understand: To comprehend the process and associated terminology

Stage IIa – Applying/User: Has sufficient knowledge, skill, or expertise to perform effectively without assistance. Can apply knowledge and skills on a day-to-day basis.

- Troubleshoot: To identify, locate, resolve, and contain process problems
- Improve: To identify and implement process improvements, by defining permanent corrective action

Stage IIb – Applying/Expert: Has extensive knowledge, skill, and experience. Is considered the subject matter expert. Can lead applications of knowledge and skills. Intelligently adapts parts for reuse.

- Invent/refine: To innovate, by refinement or redesign, as well as implement the process. Takes an advocacy position in reuse and commonality as appropriate

Figure 3. Definitions of Proficiency Levels

For each function there are very specific and detailed descriptions of what it means to be at a particular proficiency level within a specific competency. See Figure 4 for an example from the Body Engineering TMM, under the competency Design Verification and Engineering Sign-Off (Design Validation).

Stage I - Acquiring/Novice	Stage IIa - Applying/User	Stage IIb - Applying/Expert
▪ Participates in the development of test plans ▪ Supports the execution of tests ▪ Learns to use the appropriate tools to analyze data ▪ Understands the difference between a test failure and a design failure ▪ Learns vehicle, subsystem, and component level test methods as required ▪ Acquires knowledge of development/validation tools (statistical methods, CAE, etc.)	▪ Assesses relevant vehicle, system, component level tests and selects appropriately ▪ Translates DVP&R into an efficient test plan that maximizes the use of prototypes ▪ Executes the required test plan and analyzes data in a timely manner ▪ Ensures that all elements of the DVP/DCP/PV are covered by physical or analytical testing ▪ Analyzes test results and determines pass/fail based on requirements and/or expectations ▪ Can determine whether there was a test-induced failure or a failure due to design	▪ Leads the evaluation of system, sub-system, component level test DVP/PV and updates if required ▪ Is a consultant to other engineers on the development of complex test plans ▪ Demonstrates the ability to consistently perform high quality testing and data analysis in a timely manner ▪ Drives the correlation of analytical and physical test results to customer usage ▪ Develops new test/data analysis methods to improve test capability and/or efficiency ▪ Is a consultant to other engineers in reviewing unexpected results and anomalies

Figure 4. Examples of Proficiency within Design Verification Competency

Senior Engineers

The ESP project also established a new position within the engineering community called a senior engineer. Senior engineers are designated by title (it is not a management level position in responsibility or salary grade) and are determined by the functional chief engineers. These senior engineers are recognized for achieving a deep functional expertise in a particular functional area within the company. The role of the senior engineer varies by position and is discussed later in more detail. The creation of the Senior Engineer position was intended to reward experienced GSR engineers and elevate them as examples of technical maturity.

Current Status of the Roll Out

The team began implementing ESP by rolling out the project to a subset of Body Engineering, what they called the 'pilot of the pilot'. In June 2002, the functional chiefs and managers attended an all-day offsite. Here, they learned about ESP and TMM and were trained to educate their employees. In July 2002, about 200 body engineers learned about ESP/TMM from their management in all-day workshops. In August 2002, the HR team did electronic surveys of those who went through the training as well as focus groups to gain more in-depth qualitative feedback. We will discuss these results in the Analysis section.

Using course corrections based on the feedback obtained from the Body Engineering Pilot of the Pilot, the team rolled ESP/TMM out to the rest of the Body Engineering community in December 2002. In March of 2003, ESP/TMM rollouts began in Chassis Engineering. And, in May 2003, ESP/TMM rollouts began in Powertrain Engineering. These occurred with similar logistics – the chiefs and managers were trained first, and they then trained the GSR's and

LL6's. This means that the ESP/TMM project has been rolled out to all functional activities except for Electrical and Vehicle Engineering. They are in the process of developing their TMM and are planning to roll ESP/TMM out to the Electrical and Vehicle Engineering organizations in 2004.

Another round of e-surveys and focus groups were conducted in August 2003. The purpose of these surveys was to determine how the training was received in Body, Chassis, and Powertrain and identify any course corrections. Again, the results will be discussed in the Analysis section.

Ideal Vision of the Future of ESP/TMM

Present and future business conditions indicate a need for greater technical depth and less churn within the PD workforce. The ESP project is one of several initiatives intended to create practices and processes to improve PD's business performance in the long-term. The ESP project's key objective is to promote and encourage the technical depth of Ford's engineers. The project intends to be a long-lasting change that becomes ingrained within PD's organizational culture.

The TMM is tool within ESP intended to provide a model for engineers to enhance their technical depth and for PD/HR to build the supporting infrastructure components needed to ingrain the changes into our organizational culture. By utilizing the opportunity for professional growth that the TMM provides, engineers will increase their technical knowledge and skills, will deliver superior products, and will strengthen their engineering careers.

Richard Parry-Jones, Executive Vice President of Technical Affairs, said, "My vision for the engineering work force is that we will be a stable team that works extremely well functionally as well as cross functionally, and where, above all, individual expertise and technical depth is recognized and deeply respected."

And Bill Osborne, Truck Engineering Director, said, "I think it's a critical initiative because it's one of the key elements for the health of Ford Motor Company - developing a stable and technically excellent engineering workforce. It will determine the long-term ability for the company to deliver great products on a consistent basis."

Chapter 4

LITERATURE REVIEW OF CULTURE CHANGE

What is necessary for culture change in an organization?

Sandar and T.J. Larkin have several suggestions for successful communication of change in their article, "Reaching and Changing Frontline Employees". One of their recommendations is to resist the urge to verbally communicate values. To a largely cynical workforce, the words will most likely sound trite. They point out that it's far more effective to communicate your values by your actions, not what you say. For example, if an accountant were to hand you a business card with "I do not lie, cheat, or steal" on it, that would be suspicious. It is far more effective to rather have a track record of not lying, stealing, or cheating than to just tell someone that you don't. This, of course can take considerable time and effort. Too many companies do not exert the extra effort to find and state facts that reinforce the initiative, they would rather simply wrap the change in catchy words.

Larkin and Larkin also point out that there is no substitute for face-to-face individual communication. Videos, publications, and large meetings just aren't as effective means of communicating change. People may refer to videos to gain information, but they don't inspire people to change. The asynchronous one-way communication to an assembled audience also leaves the subject open to criticism and ridicule 'behind the speaker's back'. With publications, you don't need to assemble an audience. But, they are untrustworthy and are often incomprehensible. Again, a booklet is no substitute for dialogue. Now,

publications can be valuable supplemental communication. They can guide a conversation or can be used for reference after the initial communication.

Companies often choose large meetings to communicate change initiatives. Unfortunately, large meetings have some of the same problems of videos. It's mostly one-way communication to a large crowd. People are more likely to attack change rather than support it in a crowd mentality. A clear illustration of the superiority of one on one communication is the rumor mill. A company can have all of the meetings and send as many emails as they can, and they will never spread information as quickly and efficiently as the rumor mill.

Finally, and most importantly, Larkin and Larkin said that change should be targeted to supervisors on the front line. At most companies, employees have a great mistrust of senior management. The first words the employees on the front line should hear about a change should come from the person to which they are professionally closest to, their supervisor. Several studies show that employees prefer their immediate supervisors as sources of information. Larkin and Larkin recommend holding two rounds of supervisor briefings. In the first round, the senior manager explains the change and asks the supervisors for their opinions. The senior manager takes these recommendations back to the change team and they should incorporate as much as possible. People are always more apt to support an effort in which they were involved. In the second round of briefings, the senior manager reports on the status of the recommendations and explains the final plan.

Jeffrey Pfeffer and Robert Sutton provide some practical advice in their HBS article, "The Smart Talk Trap." They said that organizations that are able to overcome the paralysis of knowing and not doing share five characteristics. First, they have leaders that know and do the work. When leaders have the knowledge of what their company's day-to-day work entails, they are better able to separate

'smart talk' from discussions that will realistically produce results. Second, these organizations have a bias for plain language and simple concepts – simplify, simplify, simplify. Third, they frame questions by asking, "how," not just "why." These organizations have informal rules on how ideas are analyzed that prevent a culture of criticism from flourishing. They ask, "How can we overcome these obstacles?" This fosters productive discussions that lead to problem solving. Forth, they have strong mechanisms to close the loop. Discussion is fine, but they must have a mechanism that ensures that decisions that are reached are actually implemented. And fifth, these successful organizations believe that experience is the best teacher – learning by doing. Sometimes, this means making a decision before you have every single piece of information. David Kelley, CEO of IDEO Product Development said that, "enlightened trial and error outperforms the planning of flawless intellects."

Why culture change usually fails in large organizations

There are many articles on why culture change fails in large organizations. Conversely, if a company can learn from and mitigate these failures, then it will help them successfully change their culture. In their article, "The Smart Talk Trap," Pfeffer and Sutton discuss the human propensity to allow talk to substitute for action. In many companies, people act as if discussing a problem, formulating decisions, and drawing up plans for action are the same as fixing the issue at hand. They have coined the phrase 'Smart Talk' to describe a particularly insidious type of talk, which inhibits action. Business schools and corporate culture often reinforce this 'Smart Talk' by equating leadership potential with the ability to speak intelligently – and often. Such people also usually exhibit an even more dangerous aspect of smart talk: they focus on the negative and they favor unnecessarily complex or abstract language. The tendency to focus on the negative usually lapses into criticism for criticism's sake. And, the use of unnecessarily complex language, while sounding good, confuses people. Both tendencies bring action plans to a halt.

In Paul Strebel's Harvard Business Review article, "Why Do Employees Resist Change?," he reports that the success rate of corporate reengineering among Fortune 1,000 companies is well below 50%, possibly as low as 20%. These widespread difficulties have at least one common root – managers and their employees view change differently. Managers must put themselves in their employees' shoes to understand how change looks from that perspective and to examine the terms of the "personal compacts" between employees and the company. Personal compacts are reciprocal obligations and mutual commitments, both stated and implied that define the relationship between employees and organizations. Unless managers define new terms and persuade employees to accept them, it is unrealistic for managers to expect employees to fully buy into changes that alter the status quo.

These personal compacts have 3 common dimensions – formal, psychological, and social. The formal dimension captures the basic tasks and performance requirements for a job: including: What am I supposed to do? What help will I get? How and when will my performance evaluated, and in what form? What will I be paid and how does that relate to my performance evaluation? Unfortunately, many managers stop here when anticipating how change will affect employees

The psychological dimension addresses aspects of the employment relationship that are mainly implicit – elements of mutual expectation and reciprocal agreement that arise from feelings of trust and dependence. For example: How hard will I really have to work? What recognition, financial reward or other personal satisfaction will I get for my efforts? Are the rewards worth it? A manager's sensitivity to this dimension of his or her relationship with subordinates is crucial to gaining commitment to new goals and performance standards.

The social dimension is about the unspoken rules that apply to career development, promotions, decision making, conflict resolution, resource allocation, risk sharing and layoffs, answering the questions: Are my values similar to those of others in the organization? What are the real rules that determine who gets what in this company? This is often the dimension of a personal compact that is undermined most in a change initiative when conflicts arise and communication breaks down. Moreover, it is the dimension along which management's credibility, once lost, is most difficult to recover.

The revision of personal compacts occurs in 3 phases:

- Leaders draw attention to the need for change and establish the context for revising compacts

- They initiate a process in which employees are able to revise and buy into new compact terms

- They lock in commitments with new formal and informal rules

Unless the revision of personal compacts is treated as integral to the change process, companies will not accomplish their goals. Leaders must take charge of the process and address each dimension.

John P. Kotter studied transformation initiatives in more than 100 diverse companies and published his findings in a Harvard Business Review article titled, "Leading Change: Why Transformation Efforts Fail". He detected several trends in his observations of why these companies' initiatives were unsuccessful. Kotter summarizes these trends in eight common errors.

Error #1: Not Establishing a Great Enough Sense of Urgency – Sometimes, executives underestimate how hard it can be to get people out of

their comfort zone. Management's usual mandate is to minimize risk and keep the current system operating. This first step is essential. Without motivation, people will not cooperate and the effort goes nowhere.

Error #2: Not Creating a Powerful Enough Guiding Coalition – Companies that fail in this phase underestimate the difficulties of producing change and thus the importance of a powerful guiding coalition. At times, they lack a history of teamwork between upper management and therefore undervalue this type of coalition. Some expect the initiative to be led by HR, a consulting group, or a strategic planning committee instead of by the people who actually have the power - the leaders of the organizations where the actual change is to take place.

Error #3: Lacking a Vision – Kotter said that in every successful transformation, the company developed a picture of the future that was easy to communicate to customers, stockholders, and employees. The vision helped to clarify the direction in which the organization wished to move.

He speaks of one company who gave out 4-inch thick notebooks spelling out procedures, goals, methods, and deadlines for the change effort in great detail. Most of the employees were overwhelmed or confused. The thick notebooks did not rally them together or inspire change.

Error #4: Under Communicating the Vision by a Factor of Ten – With respect to communication, Kotter said that there were three common failures. One type of communication error is when a company develops a good transformation vision and then communicates it via a single meeting or memo. For scope, this might constitute about .0001% of the yearly intra-company communication. The second type of communication error is when the head of the organization makes a lot of speeches to employees. This might be about .0005% of the total yearly communication. The third type of error is when much

more effort goes into newsletters and speeches, but some very senior executives still behave in ways that conflict with the vision. The consequence is that cynicism among the employees goes up while the belief in the initiative goes down.

Error #5: Not Removing Obstacles to the New Vision – In order for the initiative to succeed, the company must remove all obstacles. These obstacles might include organizational structures that prevent the successful implementation of the new initiative, compensation or performance appraisal systems that reward behaviors which conflict with the values of the initiative, or even an executive who is clearly undermining the initiative. People, processes, and systems must be aligned to the new initiative in order for it to succeed.

Error #6: Not Systematically Planning for and Creating Short-Term Wins – Real transformation takes time, and a renewal effort can lose momentum if there are no short term goals to meet and celebrate. Most people won't join the effort unless they see positive results within 12-24 months. If there are no short-term victories, many people assume that the initiative will not succeed and they give up.

Error #7: Declaring Victory Too Soon – After a few years, companies often declare victory at the first clear performance improvement. While celebrating a win is fine, declaring the war won can be catastrophic. The transformation process can take 5-10 years. Until the transformation truly takes root, new approaches are fragile and subject to regression to the old ways.

Error #8: Not Anchoring Changes in the Corporation's Culture – Transformation truly occurs when the changes become the "way we do things around here". As with the prior phase, until new behaviors are rooted in social norms and shared values, they are subject to degradation as soon as the pressure for change is removed. Kotter said that there are two important factors to

institutionalizing change in corporate culture. One is to clearly show the employees how the new approaches, behaviors, and attitudes have helped improve the company's performance. Left to their own devices, the employees might not see the cause and effect of the new improvements. Or, they might contribute improvements in performance to some other unrelated cause. The second factor is ensuring that the next generation of upper management personifies the new approach. If new executives do not personify the new behaviors, the signs of renewal will disappear and regress to the old practices.

Learning Within a Community of Practice

John Seely Brown and Paul Duguid present a holistic analysis of working, learning, and innovation within work organizations in their article, "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation". They note that obstacles to work, learning, and innovation within organizations can be traced to the discrepancies between the abstractions of work being done and actual practice. That is, formal definitions of work (such as office procedures) and learning (e.g., knowledge) are abstractions of actual practice. They inevitably and intentionally omit the details. In society and many corporate cultures, the details of practice have become to be seen as nonessential, unimportant, and easily developed once the relevant 'big picture' abstractions are understood. Thus, education, training, and technology design generally focus on abstraction representations to the detriment, if not the exclusion of actual practice. It is the actual practices that determine the success or failure of an organization. Abstractions detached from practice obscure the details of the actual work. Without a clear understanding of the intricacies of actual work practices and the role they play, the organization cannot hope to engender and disseminate knowledge throughout its ranks.

Jean Lave and Etienne Wenger discuss effective and ineffective ways that people learn technical knowledge on the job in their book, Situated Learning,

Legitimate peripheral participation. Corporations conventionally endorse abstract knowledge over actual practice in most training courses. The result is to separate learning from working, and more significantly, learners from workers. The authors advise that learning by working is the soundest method of propagating knowledge. By learning through practice, employees (often new hires) acquire the ability to behave as members of the work community. They learn about becoming a practitioner, they do not simply learn *about* practice. However, they also point out that there is power in working in the periphery – as long as the employee is involved and is a part of the 'community of practice'. Being in the periphery allows one the opportunity to observe, see the 'big picture', and be more objective. Thus, Lave and Wenger coined the phrase 'Legitimate Peripheral Participation'. Again, legitimacy is required to ensure that the learner is a true member of the 'community of practice' and not isolated as only an observer. Furthermore, if training is designed so that the learners are denied the opportunity to observe the activity of practitioners, learning is inevitably impoverished.

How long does meaningful large cultural change usually take?

Leaders of successful cultural change understand that true change takes years, not months. Kotter discussed one of the most successful transformations that he observed over a seven-year period. Quantifying the amount of change on a scale of 1-10 (1 being low and 10 being high), year one received a score of 2, year two a 4, year three a 3, year four a 7, year five an 8, year six a 4, and year seven a 2. The peak of the amount of change occurred in year five, a full 36 months after the first set of visible wins. The company must have a long-term outlook and have patience and perseverance through the long process of institutionalizing change in a corporate culture.

Chapter 5

BENCHMARKING OF TOYOTA

Research Procedure

In order to learn from the experience of other companies, we conducted interviews to collect qualitative information on how Toyota achieves the technical development of their engineers. Interviews included only the interviewee plus either one or both of the authors. We interviewed five Ford employees with various perspectives and experience with Toyota: a young engineer at Ford who co-op'd with Toyota while getting her graduate degree, a engineer at Ford who worked at a Toyota Kiretsu (co-owned supplier), a Ford Marketing manager without a technical degree who worked at the Toyota's Numee plant as a quality supervisor, a Ford Purchasing Systems director who worked in purchasing at a US Toyota manufacturing plant, and a Ford director who did his PhD dissertation comparing Ford and Toyota. See Appendix A for a list of thought starter questions that we used in our interviews.

These questions dealt with technical career paths at Toyota and asked how the key points of the ESP project related to Toyota. Note that these questions were shared with the interviewees as thought starters to obtain qualitative information from a small sample size. We did not necessarily obtain an answer to every question from every interviewee. We reviewed our notes from these interviews and the following observations are common themes from these interviews.

New Hires

The technical development of Toyota engineers in Japan and in the US is similar, but with slight differences. At Toyota Technical Center (TTC), new hires go through two weeks of training: Toyota culture, CAD, etc. Then, people who have openings come and pitch their jobs. The new hires then rank the open positions by their preference. One usually gets their first choice. Engineers stay in the same position, they do not move around cross-functionally or cross-platform. At Toyota Japan, large classes of new engineers are hired right out of school. They spend 6-8 months in training, selling cars door-to-door, and working at the assembly plant. Then, the new hires go through interviews and are matched to open positions. They will remain in this position for 6-8 years. They will most likely remain within this department for the rest of their career. There are a couple of other interesting things to note. Toyota does not usually hire new engineers with master's degrees. They feel that no one can train an engineer better than they can on the job. Also, placement into a department can be somewhat arbitrary at times (as at Ford). For example, an electrical engineer might end up in Body Engineering. Again, Toyota feels that they will teach the engineer what they need to know on the job.

Senior Engineers as Mentors

In Japan, new hire engineers are assigned both a mentor and a senior engineer. The mentor is someone outside of their chain of management who advises them on a special project which they work on separate from their actual job. The special project is similar to a thesis. It is intended to benefit Toyota as well as provide another avenue for the new engineer to learn about Toyota. At TTC, new engineers are only assigned a senior engineer; they do not get a mentor or do a special project. The senior engineer is an experienced engineer who they work directly with for 2 years. A senior engineer is a regular engineer (not management) with at least 5 years experience (since TTC hasn't been around for very long, senior engineers in Japan have at least 8 years of experience) and only

works with one new engineer at a time. He selects one of his parts for the new engineer to work on. In the beginning, they might work with the new engineer about 30% of the time. They tell the new hire what to do day to day and reviews his/her work. They have to approve your drawings first, the section coordinator then approves it, then the manager. Only then is the drawing released. As the new hire gains experience, he will get more parts and depend on the senior engineer less and less.

Ford does not have this formal day-to-day mentoring. New Ford engineers learn by asking questions, from observations, and they learn from their mistakes. Therefore, it's up the new engineer to "know what they don't know". Furthermore, the Toyota process formalizes the knowledge transfer from the experienced engineer to the inexperienced engineer.

Culture vs. Initiative

Technical depth is revered both at Toyota and in Japan. If one enters Toyota as a brake engineer, they remain a brake engineer. Non-management promotions are based strictly on seniority. So, there is no competition or hard feelings. While this does foster teamwork, the interview subjects did point out issues with promotions based solely on seniority. One person cited the example of an engineer who would come in at 10am and leave by 3pm. Despite this behavior, he got promoted along with everyone else. And, the subject also cited a case where one of the sections lost their supervisor. One of the senior engineers stepped in as acting supervisor and did a great job. However, Toyota would not promote her at that time because she did not have the required seniority.

Most of the people we interviewed thought that ESP/TMM was a good idea. However, they felt it was too contrived and they were skeptical that Ford would succeed in this project. For example, one person stated that 'since it's on paper, it puts too much power in the hands of people who can hurt you'. She

went on to say that she thought it could be used like APELS (quizzes intended to determine your knowledge on a certain engineering subject), to be used against people who don't have their box checked (had not passed a certain number of these quizzes). She said that at Toyota, it's not as formal. That is, tasks related to technical development are an actual part of the culture of Toyota. It is simply what they do – what they have to do as a part of their day-to-day job. She said that Toyota uses tools to develop you, not punish you. For example, their performance review form consisted of 2 pages and 8 categories where you were ranked 1-4. Ford's forms are far more complicated. Similar to Ford, they do lay out objectives, and they are judged on whether or not they meet these objectives. The difference seems to be that Toyota uses these assessments to determine development plans. Ford will also judge your performance on your objectives. However, they will also assess an engineer's performance on several company objectives – many of which determine whether or not an engineer has completed some task (checked the box), i.e. have you passed at least 5 APELS. In order to stress their importance, the completion of these tasks is often required for one to get a promotion or receive the highest performance rating at Ford.

Ultimately, the test of whether the ESP/TMM project at Ford will truly be a culture change rather than a failed initiative lies in the hands of management, not the rank and file. Management must show that they value technical depth by their actions. They must reward and recognize technical depth, not just go through the motions as prescribed by the new process. If they do not demonstrate and communicate the value in completing the Individual Training and Development Plans (ITDP's) and other tasks related to the ESP/TMM project, engineers will just see these tasks as new box checking exercises.

Workload and Organizational Structure

All of the interview subjects pointed out that the scope of an engineer's responsibilities is very different between Toyota and Ford. Toyota eschews

digital data. They prefer hand sketches to illustrate issues and discuss causal mechanisms. They feel that if you can draw your part, then you really know your part. When they do get to doing to CAD work, the engineer does the CAD work. Again, they must draw the part to know the part. Toyota also does not have a separate Vehicle Engineering Organization as Ford does. The D&R engineer is responsible for testing and delivering all attributes related to his/her part. They are the experts and owners of their parts. Now, to facilitate these extra responsibilities, they have fewer parts and don't work on business issues such as cost, purchasing, ordering parts etc. Furthermore, Toyota's use of parts commonization also reduces workload. All of these factors help create slack in the organization that allows Toyota engineers to focus on the engineering aspects and be the technical experts for their parts.

Lessons Learned and Potential Actions

From these interviews, there are three lessons learned that might be translated into action at Ford Motor Company. First, we could adopt the process of formally assigning FCG's to work directly with more experienced engineers. Some supervisors already select one of their engineers for which the FCG to work with. But, this practice is informal and optional. Ideally, these more experienced engineers would be the Ford Senior Engineers; however, there are not enough to mentor the FCG's throughout their rotations. Therefore, a list of qualifications would need to be developed for which engineers could act as a senior engineer.

Second, we can learn from the fact that the development of technical depth is just a way of doing business at Toyota. Now, technical depth is not an issue for Toyota of Japan because technical knowledge is revered in Japan and at Toyota; while most Americans and Ford employees respect power more than knowledge. However, TTC in the United States is experiencing some problems establishing a clear technical career path. Apparently, there is a joke that TTC

stands for 'Toyota Training Center' as many of their employees work there for a few years and then go to work for Ford. The lesson that we can apply here is that all aspects of our initiative must be tied back to the delivery of day-to-day work. That way, the initiative will become a part of 'the way we do business around here'. However, we can see from TTC that even when technical depth is ingrained in the corporate culture, promoting a technical career path is still not a trivial task.

Only one of the people that we interviewed had been at TTC recently enough to still have contacts there. It was this contact that reinforced that TTC still had not established a clear technical career path. So, we don't know enough about the details to understand exactly what the issues are that lead many of these engineers to leave TTC after a few years. We can speculate that if a clear technical path is not evident, then employees will still not feel satisfied to remain a senior engineer at TTC for the rest of their career. All of the people we interviewed said that they are happier working at Ford. One said that although Ford had its problems, it is always an exciting place to work. He said that things went so well at Toyota, it could be boring at times. For the people that we interviewed, Ford fulfills something that Toyota was not providing – a higher position, more excitement, more money, or the opportunity to work for an American company.

Finally, all of these lessons learned around workload and organizational structures are intriguing. Toyota makes its engineers responsible for their parts from CAD to the delivery of attributes. In order to make this possible, the engineers have fewer parts and do not have to deal with issues pertaining to cost, purchasing, ordering parts, etc. For many Ford engineers, this would be a dream come true. If asked, most of them would say that they spend about 80% of their time doing administrative work and only about 20% of their time actually working on engineering issues. Furthermore, Toyota's extensive commonization

of parts enables this reduced workload. They don't have to redesign and retest so many parts.

Note that there are some strategic reasons why some of these changes would be more difficult to implement at Ford. For example, Toyota customers usually purchase their vehicles based on history of quality, while Ford customers purchase their vehicles based on price and styling. The extreme cost pressures have become a large part of a Ford engineer's job. And, the constraints of styling often preclude commonization.

Out of these potential course corrections, the one that most likely to be executed successfully is to ensure that all aspects of the initiative are tied back to the delivery of day-to-day work. Thus, the initiative will become a part of 'the way we do business around here'. This is actionable and within the scope of this project. The lessons learned around senior engineers as mentors and workload/organizational structure are excellent, but outside of the scope of this project.

Chapter 6

PRESENTATION OF ESP SURVEY DATA

Research Methods

Now that the ESP/TMM project had been developed and was being disseminated across the company, the HR team responsible for obtaining feedback on the ESP project and its roll out laid out a clear plan to collect both quantitative data via online surveys as well as qualitative data via focus groups. This data was reported to upper management as a status of the project as well as used for course corrections for continuous improvement. The first roll out of the ESP/TMM project occurred with select body engineering departments. The first online survey occurred in August of 2002 and solicited input from all of the people who participated in this pilot – 128 employees including GSR's (general salary role engineers), supervisors, and managers. 62 people took the online survey. Upon completion of the roll out of the ESP/TMM project to the entire Body Engineering Organization, a second survey was conducted in December of 2002. Again, all employees who had participated in ESP/TMM training were invited to take the online survey. About 854 people received this survey. There were 330 respondents, again made up of GSR's, supervisors, and managers.

The most recent online survey took place in July to August 2003 and occurred in the midst of the roll out of the ESP/TMM project to the Powertrain and Chassis Organizations. All of the people in the Body, Chassis, and Powertrain organizations were invited to take the online survey, 1670 people. Note that all of the people in the Chassis and Powertrain organizations had not yet gone through the ESP/TMM training. Thus, 686 people took the online

survey this year. By the end of 2003, the entire Chassis and Powertrain organizations will have gone through the ESP/TMM training. Consequently, there is another online survey planned for January of 2004 to capture the feedback of the organizations as a whole. Also note that the August 2002 survey of the Body Engineering pilot was done primarily to get quick feedback and course corrections in preparation for the roll out to the larger Body Engineering community. For our analysis here, we will only discuss the results from the December 2002 survey of the entire Body Engineering Organization and the August 2003 survey of the Chassis, Powertrain, and Body Organizations.

Focus groups also coincided with these online surveys. The groups were segregated by the following delineations: [1] FCG's (Ford College Graduates, those with 2 yrs or less experience), [2] GSR's, [3] supervisors, and [4] managers/chief engineers from all participating functions. In 2003, they added another group – Senior Engineers. For each group, 30 people were randomly selected from their respective population and received an invitation to participate in the focus group. In 2003, only 3-4 people showed up to each focus group session. We contribute this to people being very busy as well as due to the fact that lots of people take vacations in August. However small the participation, we were still able obtain good qualitative information from the people that did attend. For our analysis, we will mainly refer to the 2003 focus group results as we were directly involved and conducted the discussions with the GSR's, supervisors, and Senior Engineers from Body Engineering.

December 2002 ESP Survey

The survey participants in 2002 were all members of the Body organization. This is a result of the body organization rolling out the ESP/TMM program in advance of the other organizations to select Body Departments. A total of 330 people participated in the on-line survey. Of the respondents, 74% identified themselves as General Salary Role personnel or engineers, as we have

been referring to them in this document. First level supervisors (LL6) made up 21% of demographics while the remaining 5% were managers (LL5) or above. This is a fairly good mix of respondents and should be a reasonable representation of the workforce as a whole. However, with only 15 managers responding to the survey, their responses should only be used directionally.

The survey participants also had a varied background with their experience at Ford. Nearly 40% of the respondents had been with the company 5 years or less. This would mean that they had lived their entire professional career after the reorganization to Ford 2000. They had never experienced the function-based organization. In addition, the recent major reorganization would have been the first major reorganization that they had been through. Most of the remaining respondents (46%) had between 6 and 15 years of experience with the company and the remaining 14% had been with Ford for more than 16 years.

There was a good mix of participation throughout the body organization both by function and by vehicle cluster. Nearly all of the respondents identified themselves as belonging to body structures, closures, exterior systems, interior systems, safety, and seats and restraints. The respondents were spread fairly evenly throughout these groups. It is important to note that body structures has been identified as a core commodity; and therefore, most of the engineering within this functional group is done inside of Ford. The remaining functional groups primarily have the detailed engineering work performed by full service suppliers. The survey was taken at a time when there was some shuffling of responsibilities from one vehicle cluster to another. In addition, a new functional group called North American Engineering (NAE) was being formed to incorporate seats, restraints and safety personnel. The survey happened to occur when the company in this transition. Even so, the respondents identified themselves as being spread out among the 4 vehicle clusters in North America and Lincoln (which has since been absorbed by the 4 vehicle clusters). The sport

utility and truck vehicle centers accounted for 47% of the respondents, while Lincoln and the two car clusters accounted for 48%.

The respondents to the first survey seem to reflect the entire sample from which they were taken. The survey participants and thus their position, experience, function and local organization in which they work were collectively a good representation of the Body Engineering Organization as a whole. In situations where there were not enough respondents to be statistically significant, we will only use the responses as general trends. The detailed demographics and raw data for this survey appear at the end of this paper as Appendices B-H.

August 2003 ESP Survey

Another survey was taken in August of 2003. The number of participants grew to 485. Between December 2002 and this survey, the ESP/TMM training had spread throughout the body organization and had been rolled out to chassis organization. The two surveys provide some milestones to gauge the effectiveness of the roll out of the program as it progresses through the company and how the initiative is taking hold in the Body organization.

The demographics of salary position closely resemble the previous survey. Seven out of ten respondents were part of the GSR position or at the working level engineer. Of all of the people who participated in the survey, 27% identified themselves as first-level supervisors. The remaining three percent were at a manager level or higher. This mix of people is a good representation of the workforce in general. As with the previous survey, the response of the managerial workforce needs to be treated directionally because there were only 15 responses.

The responses to this survey in the area of work experience show that the respondents had more experience as a whole than in the previous survey. The percentage of respondents that had less than 5 years with the company

dropped from nearly 40% to 28% in this survey. The respondents that had between 6 and 10 years of experience remained nearly constant at 26%. The remaining 46% had greater than 11 years with the company. This increase in relative experience could be reflective of the sample size of the first survey, but could also be a result of a strict hiring restriction policy in the company over the past year. The percentage of new hires taking the survey dropped from 4% to 1%. It is also not known what percentage of the personnel taking the first survey were in their fourth and fifth years with the company at the time of the first survey (as they would now be in the 6-10 year category one year later).

About 64% of the survey participants identified themselves as most closely related to the body organization. The 310 respondents in this survey will be compared to the 330 who responded to the last survey. Most (32%) of the remaining participants identified themselves with the chassis function. This is the first time this functional group has responded to a survey. Part of the focus of the analysis of these surveys is to compare the responses of organizations within Ford that have had the program in place for a over a year to those who had just had the ESP/TMM introduced to them in the past few months.

The roll out of the NAE organization since the end of 2002 to the beginning of 2003 makes it difficult to compare the responses of the different vehicle clusters. In fact, the NAE functional organization that is responsible for seats, restraints, and safety represents nearly 41% of the respondents. However, the NAE respondents are almost all part of the old body organization and this will be factored into our analysis. In addition, the vehicle clusters have been reorganized slightly since the December 2002 survey. Unfortunately, further details on functional groups within each functional organization become more and more difficult to identify as the respondents become more widespread. This type of comparison will not be possible for this survey as the data is not available.

The detailed demographics and raw data for this survey appear at the end of this paper as Appendices I-M.

Focus Groups

In addition to the survey, focus groups of some key groups were held to get more personal and specific qualitative responses. The focus groups that will be analyzed for this research are all within the body organization. Separate sessions were held with GSR engineers, senior engineers, and first level supervisors. Participation in these focus groups did not constitute a large percentage of the total participation (the sessions averaged 4 people per group), but were used to gauge the overall "pulse" within the company and to probe deeper into the some of the issues of corporate culture.

As with the previous survey held in December 2002, the responses to this August 2003 survey represent a good cross section of the population that it was sampled from. Nearly 41% of the possible population responded to the survey. Reinforced by the responses of the focus groups, we feel confident that the survey results will provide insight into the how the organization is receiving the new organization and, more particularly, the ESP/TMM program

Chapter 7

ANALYSIS OF ESP SURVEY DATA

Why Change?

In order for a new program to work, perhaps the most important ingredient is for the people within the organization to recognize the need for the program and understand its importance. Both surveys reveal that this need is indeed overwhelmingly recognized by the organization. With a favorable response defined as either agreement or strong agreement, 97% of the December 2002 and 96% of the August 2003 respondents understood the need for technical maturity and engineering excellence within the product development organization. While this indicates potential openness to adopting a technical organization that stresses further technical development, it also hints at how much technical expertise has probably been lost by the company. This is reinforced by the discussions with the focus groups. Many participants expressed frustration with how much expertise had been lost over the past 5 to 7 years whether it is due to attrition or engineers changing responsibilities before expertise can be developed. Another common complaint was the lack of knowing where or who to turn to for technical help when problems arose. Thus, the lack of technical depth within the company appears not just to be the fear of upper level management, but is also felt deep within the organization by the working level engineer and middle management.

Is the Company Doing What it is Saying?

The second major issue to consider is the message that is being sent out from upper and lower level management. This was investigated with two

questions in the survey: "What are you told is more important – being a generalist or being technically deep?" and, "What do you believe is more valued by the organization – being a generalist or being technically deep?" The verbal message appears to be quite clear: the company sees being technically deep as more important. Nearly 90% of the respondents in both surveys felt that they were being told that being technically deep is more important than being a generalist. This is a positive sign that the message is getting out to the employees. The response, in no doubt, was reinforced by the fact that a majority of the respondents had undergone training for the Technical Maturity Model (TMM). In addition, the roll out of the reorganization was less than two years old at the time of the August 2003 survey. Accompanying this roll out were many employee off sites and "all-hands" meetings that described the reasoning behind this reorganization. The lack of technical depth and frequent employee movement from job to job were both cited as the major impetus for the reorganization. It is not surprising that the response is so lopsided to this question.

However, the response to what the participant's felt the company really believes is important was different. About 60% of the respondents in the first survey and 65% of the respondents in the second survey believed that the company really valued being technically deep over being a generalist. It is important to remember that a vast majority of the respondents had been through the TMM/ESP training before taking this survey. This may tend to influence their response as being inclined to think that the company believes that being technically deep is more important. As expected, the company has a way to go to demonstrate that this new organization and, more importantly, the new culture of spending eight to ten years within a single functional position is going to be the way it will operate in the future. Recalling lessons from the literature review, Larkin stressed that the company communicate by stating facts, not catch phrases. Furthermore, Larking reminds that face-to-face two-way discussion is

the most effective way to communicate a culture changing initiative. We discuss ways to improve the communication of facts in the chapter on Conclusions and Recommendations. However, based on the survey, the company is on the right track. Company culture is not created overnight. In a company that is as massive and has as much history as Ford Motor Company, any sort of cultural change will take several years even if it were done perfectly. In addition, trying to implement a program of technical depth that takes years to acquire in the automotive industry will also take years for the company and the employees to see the results.

Looking over the verbatim responses from the survey and the factoring in the focus groups, we think the numbers are a little misleading. Several people expressed frustration that the "old" method of switching jobs every couple of years or so was still being rewarded. In addition, as described above, many of the sub-organizations within Ford have undergone additional restructuring and reorganizations since the initial rollout. Due to the financial situation within the company, some additional salaried employees and many contract employees have been let go. All of this additional change in the organization creates short-term turmoil and will temporarily challenge the belief in any new program. Along with the above factors, many of the respondents to the survey as well as focus group participants expressed the common fear with any new program that it may be the "flavor of the month." What was somewhat alarming is that many respondents felt that their supervisors and managers felt the same way and were delaying the roll out of the new organization and/or the ESP/TMM model to their organization until they saw that it was going to succeed. With all of these factors are taken into consideration, the positive response to this question is somewhat surprising.

What's in it for Me?

The first survey also had some questions that tried to evaluate the effectiveness of the organizational rollout. One question that went right to the

heart of the matter was whether or not a person's technical expertise was considered during the reorganization. The answer was nearly divided equally in thirds between those who responded favorably, neutrally or unfavorably to this question. This points out an important opportunity missed by upper level management at Ford. If the individuals within the organization feel like their needs are personally being addressed during reorganization, the chance that they will support the change increases dramatically. In Paul Strebel's Harvard Business Review article, "Why Do Employees Resist Change?" he suggest that managers put themselves in their employees' shoes to understand how change looks from that perspective and to examine the terms of the "personal compacts" between employees and the company. Personal compacts are reciprocal obligations and mutual commitments, both stated and implied that define the relationship between employees and organizations. Unless managers define new terms and persuade employees to accept them, it is unrealistic for managers to expect employees to fully buy into changes that alter the status quo.

Furthermore, if the company had taken into consideration the new culture they were trying to create and the ESP/TMM model before beginning the reorganization, they would have been in a better position to appeal to the individuals from this cultural level. Instead, it appears that a majority of the respondents felt that the new organization was set up as a framework with the employees simply plugged in to place. Even if the technical depth could not be considered in some cases for an employee, if this fact was openly recognized by the company, Ford would have been better off to do so. This was reinforced by the verbatim responses from the second survey and the focus groups.

Many employees felt that they were simply stuck in a certain location when the reorganization occurred and there they are being told to remain. Because of the culture of constantly switching jobs into new functional areas, many employees were not in the functional area of the majority of their training a deepest expertise at the time of the reorganization. In many cases, these

employees remained in the same functional area both before and after the reorganization. This left some of the workforce feeling as if their past experiences were completely discounted by the company and left them skeptical about the company believing that their technical expertise would be important to its future. In many cases, the employees were correct. Ford made the difficult choice of trying to reorganize while protecting the programs that were currently under development. This meant that there was little shuffling of personnel into their areas of expertise. There was also not a mechanism in place to do a deep dive assessment of the company's technical proficiency down to an individual engineer level. These issues underscore how difficult it is to rebuild an organization that still has near term responsibilities to its shareholders and has been focused in a single direction for such a long period of time that all of the metrics developed only support this direction.

Do the Employees Understand the ESP/TMM Concepts?

Since the overall need and company belief that a change to a more technical organization appears to be required, the next thing to be investigated is the overall understanding to the ESP/TMM model needs to be evaluated. In the first survey, 89% responded that they understood the concepts and principles underlying ESP/TMM while this number decreased to 84% in the second survey. It is important to note again that most of the respondents had undergone off-site training in ESP/TMM prior to taking the survey so it is expected that the response to this question would be quite positive. In fact, in the second survey, only 64% of the people who did not take the training stated that they felt they understood its concepts and underlying principles. Within the Body organization, the percentage that thought they understood this concepts and principles remained fairly constant between the two surveys. This seems to indicate that the ESP/TMM model training had remained with the employees over the past year. Again, these results indicate that the company is on the right track with the

rollout of this program. The employees that have undergone the training seem to understand what is purpose is and the reasoning behind its implementation.

The next set of responses that will be analyzed deal with the ESP/TMM training and model in particular. In response to the whether they felt that the ESP/TMM training was useful, only 55% felt that this was the case in first survey. This question was not asked directly in the second survey, but the training had undergone a lot of changes between the sessions that had occurred since the pilot. One of the main differences is that a lot of effort was made to make many of the details specific and relevant to the particular functional organization that was undergoing the training. For example, upper level management identified many of the critical skills for each position within a functional group. This gave the engineers a chance to compare what they felt was important with the thoughts of their management to see if they were in-line. It also took some of the confusion out of setting up an individual technical development plan for the engineers.

Can ESP/TMM Help Build a Technical Career Path?

The belief that the ESP/TMM is among the right tools for both creating a technically sound organization and developing an individual's technical depth within this organization is not as positive as the belief that a change is necessary. Those who felt that the use of ESP/TMM would strengthen technical career paths with product development were 72% and 65% from the first and second surveys respectively. The body organization response to this dropped slightly to 67% over the eight months between surveys. The responses of both engineers and first level supervisors matched the overall response nearly identically. With a very small sample size, higher-level managers felt that the ESP/TMM would strengthen technical career paths within PD by over a 90% positive response in both surveys. This is a positive indication for the reorganization and its future. Ultimately, it is these managers that make the advancement and personal

development decisions for they employees that work for them. This positive response seems to indicate that they will take into account the engineer's technical background in these decisions. There is no indication with this survey how much the ESP/TMM or the new organization had an impact on this response, but it is still is a good indicator for the company.

The workforce also seems a little bit more tentative on how the TMM will impact their technical depth. Nearly 70% of the employees responded favorably to the belief that using the TMM would enhance their technical depth with their functional area. This number was only 60% in the second survey for both the total population and the body organization. These results seem to indicate that the TMM model may not be taking firm hold at the individual level at this point. This was shown in focus groups and the individual responses to the surveys. Many people indicated that they hadn't had time to work on the details of the TMM and their ITDP after their initial training. In addition, in some departments discussions on these subjects between employees and management had not come to fruition. The most positive responses to this question came from upper level management. The ITDP and the core values of the TMM apply less directly to this group of employees than supervisors and engineers. This perhaps underscores a disconnect between these two groups of employees; with management feeling that the tools within TMM and the ITDP are more effective than the employees who actually develop and follow these frameworks do. Ford needs to ensure that the ITDP and TMM is not simply useful for management, but at all levels of the company.

Will ESP/TMM Help Ford Motor Company?

The respondents were a little bit more positive about how the TMM will work for the company as a whole. In both surveys, about 70% of the respondents felt that the ESP/TMM project would strengthen their team's ability to meet business needs. Again, the responses did not vary greatly by position

within the company or by functional organization. Although there is only about a 10% difference in favorable response rates, focus group discussions seem to reinforce that there is a conflict going on in the eyes of some of the employees. While an overwhelming majority of employees feel that the company needs to become more technically deep and they also feel that the ESP/TMM project will help the company move in this direction, fewer of the employees feel that this change is necessarily better for them. This is an important point that Ford needs to pay close attention to, for if this conflict grows to be significant, it is difficult to imagine the ESP/TMM project succeeding.

From an employee satisfaction point of view, it is much harder to slow down the process of rotating people than it is to speed it up. Employees will respond to what is rewarded and what they feel is in their best interest. Switching jobs every 18-24 months is probably exciting to most engineers. In addition to learning a lot of new things, it also gives the impression that they are actively furthering their career by changing. It is much more difficult to convince someone that they are progressing by limiting the changes that they see. If following the ESP/TMM project is not perceived as being in their best interest, they would not adopt it. This also goes back to what they believe the company feels as more valuable. If 40% of the workforce continues to feel that being a generalist is more important to the company, these employees will continue to strive to be generalists. Demanding that they curb this behavior without changing this belief will only create employee discontent and the organization's effectiveness will be diminished. Ford Motor Company is also in a difficult situation where there aren't a lot of examples within the company that can clearly defined as successful technical experts. There are a lot of generalists, however. Management faces the challenge of trying to maintain high levels of employee satisfaction through these next few years of training and experience within a single technical function before the workforce begins to feel like they are moving towards technical excellence. Employees may agree and even want technical

depth. However, within the current state of Ford Motor Company, there isn't always the proper activities or mentoring in place to immediately fulfill this desire to obtain technical depth as quickly as possible. This interim period will be very difficult indeed.

Communication Around Technical Depth

There are strong indications that technical depth is becoming part of the everyday communication between upper level management and their employees. In both surveys over 70% of the respondents felt that technical depth and competence were emphasized more at the time of the survey than the previous year. This is indeed a positive sign for the body organization as some of the respondents were approaching two years since their initial training at the time of the second survey. This means that technical depth, at least at a high level and not necessarily the details of the TMM, has remained part of the message that is understood by the employees.

As discussed in a previous section, from an individual employee's technical development standpoint, the Individual Technical Development Plan (ITDP) is at the heart of the TMM training. It is through this plan that the employee assesses what skills are the most vital to perform their job and how proficient they are with these skills. The ITDP also lays out possible next steps to be taken to gain further proficiency in these areas. In addition, the ITDP is the basis for discussions and comparison of assessment with both immediate and upper level management. In both surveys about 65% of the respondents had completed their ITDP. The response was about 8% higher for those who identified themselves as part of the body organization as compared to chassis. This is a positive sign that some parts of body are continuing to adopt the ITDP. However, most of the body organization had completed the training several months prior to the second survey. It is slightly alarming that the response rate is not more favorable. The most common reason stated for not completing the

ITDP was not having enough time, although several respondents did point out that they did not see the point in using the tool since they felt the tool was either not useful or was not going to be used in aiding in their career.

As a follow-up question, the survey participants were asked if they had had a technical development discussion with their supervisor and manager. Here the responses showed a remarkable improvement from the first survey to the second survey. In the first survey, only 53% of the employees reported to having such a discussion and this number rose to 69% in the second survey. The body organization had similar results to the overall response of the second survey. However, slightly more than half of the people who responded favorably to this question felt that this discussion was better than previous technical development discussions that they had had with their superiors. The last few responses seems to question how firmly the ESP/TMM is taking hold as a normal way for employees to chart and plan their technical development and their management's use of this idea and the relevant tools in discussing technical development with their employees. It seems to indicate that the training may not be leaving the classroom in many cases and getting full adoption within the functional organization. We can infer that people are just "going through the motions" to satisfy the ESP/TMM requirements.

One of the possible reasons for this is that the use of the ITDP and the TMM is not strictly mandated for performance reviews and other development discussions as other tools are. For new concepts and with the magnitude of the task that Ford is undertaking in the technical development of its employees, perhaps a more strict adoption of these tools is required. Among the discussions with supervisors and engineers that took place in the focus groups, many still expressed confusion about the ITDP even after training. In Pfeffer and Sutton's article, "Smart Talk Trap", one of the keys to overcoming the 'knowing' and the 'doing' gap is to avoid wrapping initiatives in complex language and to simply,

simplify, simplify. The gaps can only be overcome if the right activities and mentoring systems are in place. Instead of continually discussing 'why', the company needs to focus on the 'how'. We discuss ways to make the ITDP an integral way of doing regular business in the Conclusions and Recommendations section. Supervisors were especially perplexed by what they felt was a rather complicated and hard to work with document that made up the ITDP. In addition, many engineers felt that the use of the ITDP was not mandatory and was not necessarily encouraged by their management. Despite these complaints, about 70% of the respondents remained satisfied with the technical discussions that had with their management (those that responded that they had had some sort of technical development discussion in the first place).

If the ITDP or equivalent technical development plan was developed, a very high percentage (greater than 80%) responded that they were in fact implementing their plans. This is a very positive sign that should be tracked in future surveys. It is another indicator of the momentum that the ESP/TMM project has within the organization. The ITDP is also at the ground level within the organization. The use of the tool would also indicate that the type of work and the purpose behind the work might also be shifting focus toward a technical nature. It would be expected that this number would initially be quite high and would remain high if the project is fully adopted by the company. However, if interest wanes in the project, this would be a great lead indicator, as the percentage of favorable responses would start to weaken.

Senior Engineers

Finally, the August 2003 survey included questions on the Senior Engineer classification and Technical Specialists positions. Nearly 80% of the respondents indicate that the Senor Engineer position is a step in the right direction toward creating more opportunities for a technical career path in PD. The focus groups with engineers, senior engineers and supervisors really

reinforced this positive response. Discussions with these groups indicated a number of points about the senior engineer position. There was overwhelming approval about the individuals selected for the senior engineer classification. In our day-to-day conversations, we don't recall hearing anyone object to any individual that was selected for the position. This is extremely positive. One of the keys to creating this classification of someone who is an expert in their individual field is ensuring (especially initially) that the right people are selected for the job. If mistakes are made in this regard, the position can lose the respect of the workforce before it is even established in the workplace. In a worst case scenario, the position eventually would become something that is not earned, but rather given after an employee has invested enough time with the company.

The other, almost universal, response was that there were not enough senior engineers to go around for the company and there were many other people that were deserving of such a position. Through discussions with the human resources department within Ford, the number of senior engineers chosen for the initial election was deliberately kept to a small number. This was to ensure that the position kept its technical integrity and to allow for the slow growth of the total number of senior engineers. The hope is that through advancement and attrition there will always be a few senior engineering positions available to deserving employees. The fact that many felt that there were a number people who deserved such a position should be taken as a positive sign for Ford. It is essential for Ford to collect and cultivate all of the technical knowledge at their disposal at this critical juncture for the company.

Another theme of the focus groups is that there doesn't appear to be a detailed plan in place for the utilization of the senior engineer. Senior engineers ultimately need to be the primary source for mentors within an informal "apprenticeship program" that is necessary to provide the technical guidance the workforce requires. The senior engineers reported being used quite differently.

Some reported that they saw no difference in their day-to-day activities after being classified as senior engineers and others reported being contacted by many programs to aid in "fire-fighting" activities. Supervisors had similar responses. Many admitted to not using the senior engineer position yet, and many felt that the senior engineer should spend at least part of their time as a consultant to other programs. The idea was to use their technical expertise to help with the design of critical sub-system within a vehicle and to help teach other engineers. The frustration of not having enough senior engineers in place to do this extremely effectively at this point of time came through at this time. Hardly any of the engineers reported having much (if any) contact and learning experiences with the senior engineer of the appropriate functional expertise. Many even expressed that they did not know whom this person would be or how to find them. The apparent lack of this detailed plan should again be taken as a warning sign to Ford. In an environment where management is concerned that there is a tremendous lack of technical depth within the company (a belief that seems to be held by most of the workforce as well), every effort needs to be made to maximize what technical depth the company does have. In addition, the senior engineer position is also symbolic of the company's change in belief that a technical career within the company is what will be valued and rewarded. The position must remain highly visible and accepted fully by the workforce. This lack of clarify about this key resource in developing technical expertise is telling data about how well the ESP process is going at Ford

Overall Observations

The overall feeling felt day-to-day at Ford, the focus groups, and the verbatim responses from the second survey seems to be more skeptical and negative than the survey results indicate in hard numbers. Perhaps the respondents to the survey were more inclined to be favorable toward the project than those who did not take the survey. The new organization is in place and this has had an impact most of the jobs within engineering. The physical relocation

of many of the engineers and the reorganization of these engineers into functional groups probably has had some positive effect on the technical depth of the workforce. Other engineers that perform the same function as themselves are now much more easily identifiable and assessable. However, it is debatable on how much further the technical development of these engineers has progressed.

The overall feeling from personal responses from engineers is a great deal of skepticism about the ESP/TMM project. Many feel that it is simply another "box" to check for advancement up the company ranks. For the past several years, Ford has suffered from having too many supervisors and managers for the number of positions available. In addition, there have been a number of qualified engineers for supervisory positions that have waited several years for promotion. Unfortunately, the survey does not tap into this area of skepticism and probably should in the future. As a result of the number of engineers waiting to be promoted, the number of qualifications for these positions has informally increased. Many engineers see the ESP project as another informal qualification for promotion; or even worse, another roadblock to prevent promotions.

Another source of skepticism involves the usual "flavor of the month" mentality. This prompts many of the engineers to sit back and wait to see what will happen. They don't feel like participating in using any new tools until they are forced to do so or it is obvious that this is a new way of doing business. This would be true of any new program. Unfortunately, the challenging current business climate that Ford is currently in has forced a number of smaller reorganizations and the movement of personnel. This fuels the skepticism that the stability of the workforce is not a main priority of the company. What is unusual in this case, is that this skepticism seems to propagate to levels within the upper management. Several people who participated in the focus groups reported that their management had yet to roll out or endorse the project. This

can create many roadblocks to the projects success. If entire departments are not proceeding with the program and are resisting its adoption, there is little chance that it will become part of the entire company's standard operating procedure.

Another source of concern among engineers and first level supervisors is that the ESP/TMM project has little to do with an individual's training and development at all. The actual functions on the job must relate to the project as this is the "doing gap." Instead, it will be used mainly to restrict employee movement. As discussed above, many employees felt that the reorganization was undertaken without considering their individual skills. Many employees were not in positions at the time of the reorganization that were not in the area of most of their experience and training. These employees feel that their previous experience has almost completed been discounted under the new organization. Some engineers in our focus groups reported that fellow employees have been told by their organization that they cannot change positions to other functional groups since it doesn't support ESP. On the other hand, the recent smaller reorganizations have moved several employees from areas of their interest to different functional areas. This is something that needs to be closely monitored by the company.

Overall, we get the sense that technical depth and development is not a critical part of the day-to-day activities of the company. Inside of the body organization, it appears from the comments received that the project is at a critical junction of its implementation. The initial training was well received, but the momentum from these invents is waning. Unfortunately, in an effort to rollout the project to the rest of the functional organizations, many of the company resources devoted to instituting the ESP/TMM project within Body have been diverted to these other groups. This is an extremely fine line to walk. On one hand, it is recognized the need and the desire for the other functional groups to start the training and implementation of the program. However, as the

initial adopters of the project, other organizations are looking to Body and its progress to judge how effective the program will be. If the other organizations see that Body is not fully utilizing the tools and principles of TMM, they will be less likely to throw their full support and effort behind the program. In addition, if the organization basically lets the project become ineffective it will be nearly impossible to resurrect. Instead, a new program would have to be developed for credibility and then it will seem like the next flavor of the month program. As Kotter said in his article, "Leading Change: Why Transformation Efforts Fail", critical mistakes in any phase can have a devastating impact, slowing momentum and negating hard-won gains. We feel that the project is at a dangerous juncture. The company must ensure that mistakes are corrected and do not become critical. It is clear that the success of the ESP/TMM project within Body is vital to its success company-wide.

Chapter 8

CONCLUSIONS AND RECOMMENDATIONS

General Observations

There is a clear recognition at all levels and positions within the engineering community that Ford Motor Company lacks the engineering expertise that it once had and will need to remain competitive in the automotive industry. In addition, there is also nearly universal support for the basic concepts and underlying principles of the ESP/TMM project. This is vital for both the reorganization and any program that promotes the technical development of the company's personnel to succeed.

General Observations

- 2001 Re-organization was received reasonably well, most employees understood the reasons behind the re-org
- Still some negative feelings because people did not necessarily end up in or were moved out of their areas of greatest expertise
- Employees and management feel that it is important for engineers to have a technical development plan
- While employees felt that the ESP training was good, they were still confused a few weeks later on what they were supposed to do
- Data shows that the momentum of the ESP project is stalling within Body Engineering. People are skeptical about company's dedication to this initiative. They are adopting a 'wait and see' attitude. Some still feel that being a generalist is better for their career.
- The Senior Engineer position was well received, but their utilization is not clearly defined and therefore, are not as effective as they could be
- Body Engineering is at a critical juncture right now. Other organizations are watching to see whether the initiative succeeds or fails in Body.

Table 2. Summary of General Observations

The reorganization was received well by the company's employees in general. There are still some significant negative feelings felt by some employees

since many people were not currently working in their area of deepest expertise at the time of the reorganization. While there was some reallocation of resources, it was not significant. And in some cases, people were moved out of their area of deepest expertise. However, most engineers feel that having a technical development plan is important and this is reinforced by most of management. They too, feel it is important that their employees have a technical development plan.

Most employees received the initial ESP/TMM training favorably. The main complaint was that some felt that the information was too complicated to easily understand after reviewing the information a few weeks after the training had been completed. Again, one of the lessons learned from our literature review is to overcome the 'knowing' and the 'doing' gap by avoiding wrapping initiatives in complex language and to simply, simplify, simplify. Instead of continually discussing 'why', the company needs to focus on the 'how' – how the ITDP fits into the employees' day-to-day work. While many felt that creating a technical development plan was important, around 40% of those surveyed had not completed these plans several months after receiving the training. In addition, many had not had technical development discussions with their management.

Furthermore, the momentum of the initial rollout of the ESP/TMM project within Body Engineering appears to be stalling. Some of the resources that were devoted to this initial rollout are being diverted to assisting in the rollout of the project within other functional organizations. There still seems to be some resistance even among management to the complete adoption of the project. The continual additional reorganizations within the functional groups send a mixed message to employees about the importance of employee stability. At the engineering level, while the need for increased technical depth has been clearly communicated and is generally believed, the tools provided by the ESP/TMM project have not been emphasized enough and are not being adopted

by a critical mass of the community. Management is tracking whether or not all GSR engineers have completed their ITDP (Individual Technical Development Plan) by the end of 2003. However, it currently seems to be more of 'check the box' exercise. They just want to know whether or not you have done your ITDP. There has been no further discussion with management on what the ITDP is supposed to accomplish. There is also some skepticism about the company's complete backing of the project and many feel that taking the generalist's path is still the best decision for their career. In addition, many engineers felt it was in their best interest to take a wait and see approach to the ESP/TMM project to avoid investing a lot of time in something that appears to be a 'flavor of the month' exercise.

The senior engineering position was well received by the engineering community. The personnel selected for the senior engineering position were generally happy with the honor and recognition bestowed upon them when they received the designation. However, nearly all levels of management admit that the utilization of the senior engineering position has not been executed well. There doesn't seem to be unique roles and responsibilities in place for senior engineers or a universal plan developed by the company to use them.

Based on the above observations, this is a critical time for the adoption of the ESP/TMM project in Body Engineering. Since the body organization was chosen for the pilot of the program and the initial rollout, it is vital that the project succeeds in Body Engineering. Other organizations within Ford are observing and investigating how the body organization is using the project and will tend to follow Body's lead. If the project is not a success within Body, it is unlikely to be successful elsewhere in the company. The failure of the ESP/TMM project does not necessarily mean that the reorganization will be a failure, but the underlying concepts and principles of the project are a sound foundation for the rebuilding of a technical organization. If the ESP/TMM

project were to fail, something similar would have to be developed to take its place at an extremely high cost in both physical and human resources. In order to increase the chance of success, the following section presents several actions the company should take.

Recommendations for Next Steps

- Communication should come from front line supervisors and managers. And, should be communicated through actions in addition to verbally.
- Ford should avoid rewarding fire-fighting efforts as it has in the past, and find ways to reward and recognize technical depth. Promotions should be made due to technical depth and these reasons need to be communicated.
- The ITDP should be mandatory (maybe replace LDEP paperwork) and become a part of PR discussions. Supervisors and managers should use the ITDP to support staffing and promotion decisions. Ford should resist the urge to create metrics requiring certain levels of proficiency in each department. This would encourage inflation of assessments for political reasons and would turn the ITDP into a box checking exercise.
- ESP/TMM should not be used to prevent the movement of people to areas where they would be more effective or comfortable. However, through ESP/TMM, the employee must understand what this move might mean to their career (possible delay of promotion).
- Ford should maximize the leverage of existing technical depth by focusing senior engineers up front in programs - where critical decisions are made, and at key technical milestones.
- The best metrics to measure impact of this initiative are all long term: improvements in program performance in cost, timing, issues generated, warranty, quality, and recalls. Since seeing these results will take years, we also recommend some short term metrics: the use of the ITDP, survey of the adoption of ESP/TMM initiative, and employee satisfaction.
- Ford could also look to outside resources for more research/help on growing technical organizations.

Table 3. Summary of Recommendations

Recommendations for Next Steps:

Communication

As with nearly any organizational concern, clear communication is a key to success. The ESP/TMM project is no exception. Ford has instituted a monthly communication of key points about ESP that gets e-mailed to all

personnel within product development. While this is a great idea, the real key for the adoption of the project is closer to the grass roots level and needs to be built into all the engineering work done throughout the company. The significance to the company's success of the ESP/TMM project that has been communicated at the highest level of management needs to be echoed strongly at the first level supervisor and manager level. The real key is to make TMM principles 'the way we do business,' like it is at Toyota. With the years of neglect and few examples for engineers to follow, the principles must be overtly stated and reinforced continuously. It will take years for the idea of being technically proficient to become secondhand and the new culture to take firm hold within the company. At that point in time, deliberate communication will become less important as young engineers will be surrounded by more experienced personnel that will provide "hands on" examples to follow. The technical development of employees will be ingrained into the company culture and very little effort will need to be expended to maintain it. Clearly, Ford Motor Company is not close to this point at this time. Communication needs to deliberate and emanate from all levels. It is very important that higher levels of management stress this necessity to their employees and the message gets passed down the chain in regular day-to-day discussions as well as through their actions.

In order to be effective, the communication cannot be limited to the ESP/TMM project alone. Instead, the goal should be to make technical proficiency a way of life. Most communication from upper level management is careful to include the business details of engineering challenges and successes. This must be expanded to also include some of the technical aspects of the problem. It must be stressed that Ford is a technical company that is able to develop better solutions than their competitors because of their technical depth. In other words, it needs to be made clear that technical proficiency is one of the most important resources that the company possesses. This goes to the heart of all communications. New values need to be stressed, new types of heroes need

to be discussed, and different projects and actions should be celebrated all in-line with the new culture.

Reward and Recognition

In addition to communication, special care needs to be taken so that the proper behavior is encouraged and recognized. Over the past decade, the technical aspect of the solution to engineering problems was often overlooked. Recently, efforts have been made to change this. They need to be continued and intensified. Special attention should be given to encouraging problem prevention versus fire fighting. If an engineer completes all of her technical milestones for a program on time and passes all of the design verifications for her parts the first time, this needs to be encouraged more strongly than rewarding a quick fix to a part which fails during validation. The key is to get the mindset of avoiding problems from ever occurring as being as highly valued as solving problems that do occur. Communication plays a large part in this area as well. Several departments have established an "Outstanding Technical Achievement Award." This is a step in the right direction, but it does not go far enough.

Management needs to recognize and stress behavior that needs to be followed. With Ford's current situation, it is the small details that need to be recognized as much as larger picture. For example, people that have dedicated most of their career to being technically deep in a functional area should be recognized to their coworkers. This is the type of behavior that the company wants to be the standard. When making personnel decisions, an employee's technical expertise should be highlighted as a chief reason for their promotion in personnel announcements. Understandably, these first two recommendations sound very generic and straightforward. However, they are also the most crucial. The focus groups reveal that some of the biggest obstacles for the incorporation of the ESP/TMM project can be virtually eliminated with special attention paid to communication and development and reinforcement of proper behavior.

Since we feel that the lack of technical depth within the company is one of the largest problems facing the company, the attention to details is well worth the resources expended to make it happen.

The Role of the Individual Training and Development Plan

At the heart of the Technical Maturity Model from the individual engineer's perspective is the Individual Technical Development Plan (ITDP). Within the Body Engineering, at least, a significant portion of the engineering population had yet to complete their initial ITDP. In addition, the focus groups revealed that some departments were still resisting the rollout of the project. This is obviously very detrimental to the success of the project. The ITDP process must become mandatory. It is essential that the engineers complete their ITDP and through consultations with their local management and further training and career development, the document should become a living document. Additionally, supervisors and managers should use the ITDP to support staffing decisions and promotions. Ensuring that the process is followed within Ford culture is relatively straightforward. In the short term, it needs to be added as a line item on the performance reviews of all members within engineering. At the engineer level, the requirement would be to (after initially completing) have an annual update of their ITDP and have quarterly discussions around their development plan with their supervisor and manager. The time for these discussions can also coincide with the midterm and end of the year performance reviews that are already in place. The ITDP can be an aid in looking to the future as the performance review evaluates the past. The initial "forcing" of the adoption the ITDP also highlights that the document will be around for a while. In addition, staffing decisions must be clearly linked to the ITDP's of the department. This direct linkage will also reinforce the importance of the document. It is important to understand that our recommendation is that the completion of the ITDP and discussion with the management should be a part of the performance review, obtaining certain levels of proficiency should not be tied

to this process. Putting demands of proficiency ratings for departments or individuals would encourage inflation of assessments for political reasons within the organization. The ITDP would quickly become a "box-checking" exercise that would lose most of its effectiveness. The original intent of the ITDP was to be a personal file that aids in the technical development and dialogue of an engineer and her management. All efforts should be made to preserve this original intent.

With the ITDP process in place, some steps should be made to make the completion process easier on the engineers and their management. The initial part of the ITDP document is to list the generic skills that are recognized in the product development organization. These skills are placed against the roles and responsibilities for each individual engineer. The importance of the skills for each role and responsibility are ranked and the top skills for any particular position are identified. Some of the other functional groups have taken the extremely helpful step of identifying the skills that they feel are vital for given position within their organization. This sends the message to the engineers what management is looking for in a technical employee. If an engineer is confused or disagrees with some of these assessments, it provides an excellent point of discussion during the ITDP reviews. This practice needs to be adopted by the Body Engineering immediately. The process should not be very difficult. With a little over 60% of the body organization having completed their ITDP, this initial step of the process could be made anonymous and used by a small committee (with both engineering and management representation) to develop a generic ITDP for the limited number of positions within each department. In this way, the roles and responsibilities and vital skills for each position will become more straightforward and engineers can work to be on the same page as their management. The generic ITDP should remain a living documented and updated to meet the changing demands and technical depth of the workforce.

The next step of the ITDP process is to rate the individual's proficiency against the 4-5 key skills identified in the previous step. This is compared to the long-term proficiency level that the engineer feels is necessary to have technical depth within their function. Management should add their expectation of proficiency level to the generic ITDP. The reasons mirror the ones mentioned above. As part of the final step of the ITDP, the engineer puts together a plan to help increase their proficiency level. Body Engineering should provide a list of possible actions that an engineer could take that might improve their proficiency levels. While the engineer and his management would have the opportunity to suggest other appropriate methods that do not appear on this list, suggesting actions would be another method of communicating preferred behaviors throughout the organization.

In the short term, additional refresher sessions (a half hour or hour in length) should be given to both engineers and management (separate sessions) to reinforce the ITDP process. Several supervisors in focus groups and in private conversations asked for additional materials that stripped down the ITDP process to its basic steps and principles. This material should be generated and could be used as a guide for the refresher courses. The sessions would not have to be a permanent fixture in the Ford culture. As the ITDP process becomes a way of doing business, the refresher courses should not be necessary. Of course, training sessions for the ESP/TMM project will need to continue for new hires into the company and for engineers who get promoted up the management chain.

Finally, the use of the Ford intranet in conjunction with the ITDP should be utilized more completely. The generic ITDP for each position with in the functional group should be posted on-line (the ESP/TMM project have already established a very comprehensive website). We would also recommend that the individual ITDP for each engineer also be confidentially created,

maintained and stored on-line. This should make it easier to keep the ITDP up-to-date and in-line with the latest generic ITDP. It will also make it easier to manage for the supervisor and manager. In addition, as metrics for tracking the progress of the technical maturity of a department, some of the data and self-assessments can be used to anonymously provide status of different departments.

Managing Movement of Employees

There is still some opportunity to respond to some of the complaints that the company did not take into account a person's technical depth at the time of the reorganization. Instead, the company kept people mostly in similar areas where they were currently working when the reorganization was announced. There were some exceptions to this, but Ford was also trying to prevent major disruptions to products that were already under development. Many engineers still feel like they are trapped in their current position and some have been told by management that they can not move to different positions since it would violate the ESP. It needs to be recognized that not everyone can be accommodated. After all of the upheavals of the recent reorganization, the company cannot afford to have a lot of people changing positions yet again. Ford Motor Company still has the responsibility to ensure that all functions are adequately staffed to meet its commitments to its customers and shareholders. However, the ESP should not be used as a method to prevent people from moving to areas of the company where they would feel more comfortable. Ford should be striving to eventually place their personnel where they will be the most content and effective. Instead, management should use the TMM as a tool to help in this area. If a position is open and his current position can be back-filled, the person should be provided the opportunity to switch. It does need to be explained to the engineer that this will have some impact on their career. They would need to complete a different ITDP in their new position and perhaps not all of their prior experience would be applicable. Frequently changing positions into different functional areas will delay the opportunities for promotion (in other words, the

exact opposite of the behavior that was rewarded in the nineties and early this decade).

Special management attention has to be given to remove the stigma of people who want to remain in engineering, but don't have a desire to move up the management chain. Creating the senior engineering position in combination with technical specialist positions (that are equivalent to first level supervisor position) are steps in the right direction. However, realistically, there will never be enough of these positions available to satisfy the technical community within the company. At Toyota, we have learned that an engineer that has dedicated significant time and effort to the company is celebrated regardless of where they end up on the management chain. At Ford, there is a negative stigma attached to someone who does not change jobs within the company frequently or doesn't strive for management positions. This is not part of the culture that Ford is now trying to create. Engineers should be rewarded and recognized for providing dedicated service in a single technical area. The rewards don't necessarily have to be promotions. Currently, Ford offers token awards at certain milestones of service (five years, ten years, etc) to the company. Perhaps these awards could be extended to recognize years of dedicated service to a particular function. It might also make sense to create a couple of levels of engineering based on technical competence. Other companies denote "A" and "B" level engineers based on their experience. This designation can simply be a title and doesn't have to be linked to salary grade. It would simply be another reinforcement of the desired behavior.

Distribution of the Engineering Workforce

Restoring and rebuilding the technical proficiency of the company will not happen quickly. Everyone in the company seems to realize this. One of the challenges of the automotive industry is its relatively slow "clock speed." Most people who we discussed the topic with agreed that it takes at least two product

development cycles for an engineer to start to be proficient at his job. This allows for the initial learning process to occur and provides the opportunity to practice what was learned the first time around. Hopefully, during the third and fourth product development cycles the engineer is refining his skills and working on becoming an expert. In the automotive industry, product development programs typically last around four years which would put technical proficiency for an engineer within Ford to take somewhere between 7 and 9 years. In a company that recognizes that they don't have a lot of technical expertise, the timeframe before seeing results is several years into the future. While management recognizes this, there still should be an emphasis on seeing results as quickly as possible. The best way to do this is to maximize the leverage of the existing technical depth. The current senior engineers and technical specialists represent this resource.

Utilization of the Senior Engineer

The key to maximizing the impact of the senior engineering community is where and how they are utilized. This is not a trivial matter. Ford is at a critical juncture where a lot of their technical depth has been stripped away. As discussed above, rebuilding this depth will be a difficult process. Senior engineers must be in places where they have the best opportunity to not only affect the bottom line of the company, but also share their knowledge with the rest of the engineering community.

The two areas of the product development process where the senior engineers can have the largest impact is during initial product design and at technical checkpoints. Many of the warranty concerns and late, expensive changes can be linked to decisions that were made very early on in the program. Compromises were often made without adequate information on the impact of these decisions. Senior engineers need to be very involved and their efforts concentrated in these early stages. Ford used to maintain an initial or advanced

program development group. Through the reorganizations over the past several years, the size and importance of this group has been reduced dramatically. We would recommend reforming this organization and have it populated with experienced personnel. Every significant program should start in this organization and the major compromises that are made should be carefully documented. The experience personnel in this organization will quickly hone their skills working alongside senior engineers from all functions. The impact will be to have programs built on strong foundations and the senior engineering community reaching a critical mass as quickly as possible.

Another area where the senior engineers and technical specialists should be utilized is as consultants especially during key technical milestones in a program. One of the requirements for passing through certain product development gateways should be that this consultation has taken place and the recommendations of the technical reviewers are documented. As stated in the previous section, these consultations will be the most valuable the earlier in the product development cycle that they occur and the more detailed they are. The benefits of this consultation are great. First, it obviously presents a situation where errors with the design can be fixed and robustness can be improved. The technical community will have a chance to reexamine some of the compromises that have been made and step in if the risks seem to be too great. The consultation also provides a teaching situation between the experts in the company and those with less experience. The information that is passed on during these sessions will not only help immediately, but will provide for more robust designs in the future.

These consultations are also an opportunity for the senior engineers and technical specialists to gain recognition throughout the company. The personal relationships that will be generated will be beneficial during times of technical crisis in a program. Engineers will be familiar with some of the resources

available to them. Even after the senior engineering community has grown to the critical mass, the benefits of this consultation will still be reaped. It not only an opportunity for outside opinions and different ideas to be surfaced, it will be a way for the different vehicle clusters to share some of the best practices that they have developed. It is one thing to develop best practices, but Ford has had trouble (as do most large organization) diffusing these practices throughout the company. Technical consulting and mentoring is a chance to teach these practices in a "hands on" and extremely practical environment. Keeping the intent of these consultations pure is the difficulty with this recommendation. The consultations need to be formal enough to ensure that they occur, but informal enough so that a lot of knowledge sharing takes place. The idea is for the program teams to look forward to the reviews as an opportunity to make improvements. If they are allowed to turn into a "checklist" exercise, they will not be effective and will not deliver on many of the benefits listed above.

In the future, the efforts of the senior engineering community should be focused on design processes in addition to the areas mentioned above. There are simply not enough personnel to have this process begin immediately. While Ford has many system requirements and specifications, they don't have many practical design guidelines that simplify the process of designing key systems throughout the company. The senior engineering community and Tech Clubs should be used to develop and maintain these guidelines. The consultations mentioned above would help ensure that they are put into practice. The design guidelines provide a change to codify the knowledge in the company. They provide the opportunity to virtually mentor the engineering community when face-to-face communication is not possible. If events in the future again cause Ford Motor Company to lose a lot of its technical knowledge, at least some of it has been captured. In addition, new ideas and practices can be more quickly disseminated throughout the company.

As the senior engineering and technical specialist community reaches a critical mass, Ford will also have the benefit of having the rest of the engineering community developed deeper technical depth. At this point, experience and technical depth should be spread more or less evenly throughout the company. This will provide the maximum benefit of the senior engineering community and put even the senior engineers in positions to maintain and develop new skills. The only exception to this is upfront in product development. This critical time in the company should always be staffed with the most experienced of personnel.

Drawing from our Toyota benchmarking, we could adopt the process of formally assigning FCG's to work directly with more experienced engineers. Some supervisors already select one of their engineers for which the FCG to work with. But, this practice is informal and optional. Ideally, these more experienced engineers would be the Ford Senior Engineers; however, there are not enough to mentor the FCG's throughout their rotations. Therefore, a list of qualifications would need to be developed for which engineers could act as a senior engineer.

Workload and Organizational Structure

Recall the previous discussion from Chapter 5 on Toyota's workload and organization structure. Their engineers are the experts and owners of their parts. They are responsible for delivering all aspects of their parts – from CAD to development of attributes. Now, to facilitate these extra responsibilities, they have fewer parts and don't work on business issues such as cost, purchasing, ordering parts etc. Furthermore, Toyota's use of parts commonization also reduces workload. All of these factors help create slack in the organization that allows Toyota engineers to focus on the engineering aspects and be the technical experts for their parts. If Ford cannot implement more commonality, it will be in jeopardy of not having enough 'slack' resources to sustain this technical culture in the long term. Shifting of people/resources from ancillary jobs to design and

release along with the responsibility would also help enable the engineers to be the technical experts for their parts.

Metrics

The success or failure of the ESP/TMM project is difficult to judge. Some of the metrics that should be impacted by the project are improvements in program performance in terms of cost, timing, issues generated, warranty, quality, and recall metrics are impacted by many other projects and factors within the organization. However, they still should be considered the most important metrics to verify the project's success. However, with program life cycles approaching four years or longer and quality, warranty, and recall data not fully understood until a vehicle has been on the road for several additional years, Ford is several years off before they will see any impact to these fundamental metrics. Short-term metrics to tack the projects success need to be established. The surveys and the ITDP are excellent starts to developing some of the metrics. The surveys track the adoption of the project and indicate employee satisfaction and impact the project is having on their day-to-day activities. The ITDP, especially if it was stored on line and individual data was available to the human resources department anonymously could provide an overall assessment of how technical depth is growing in the company. It also could point to key areas where additional training is most sorely needed. Remember, the ITDP should be reviewed for each individual up to the managerial level. However, better metrics are still needed to track the stability of the organization. With Ford's current tools, they are only able to track people from a department standpoint. This is not an effective way to measure if an engineer is performing a similar job in a similar technical area and building up their technical depth. An engineer may switch departments, but is still working with in the same technical area with similar roles and responsibilities. Another situation is that an engineer may switch jobs within a department and be performing very different tasks. Tracking solely by department number and salary grade position misses this. We would

recommend that the human resources department have some way to identify what technical area the engineer is associated with and what are their responsibilities at the most general level. The current method of tracking by department should be discontinued since it provides almost as much misleading information as it does helpful metrics.

Extraneous Factors

It should be noted that the lack of technical knowledge within the company is not the only problem that is facing Ford Motor Company. As with any large and complex organization, it is difficult to focus on one thing, as so many different factors seem vital. The automotive industry has grown increasingly competitive over the past few years. When this is combined with a weak economy, Ford has had to react by cutting back in many areas. The main reason most respondents to the survey gave to not filling out their technical development plans to not having enough time. Ford has stretched its human resources very thin in these times of need. There are no slack resources for learning and innovation. Referring to Lave and Wenger's article, this is an obstacle to periphery participation. The employees are working so much on immediate pressing issues; there is no time for observation, learning, and introspection. Recall from the Toyota benchmarking that they have lots of slack built into their approach. Therefore, they can learn and change much more easily.

The lack of technical knowledge is a major contributor to programs not being delivered on time and rising warranty and program costs, but not the only one. Programs are not strictly following the Ford Product Development Process and are not necessarily held up if all gateway requirements are not met. Late program decisions for styling and marketing reasons also impact the robustness of designs. Ford Motor Company in its recent history has not done a good job of sharing designs and communizing parts across different products and platforms.

The result is that each new program unnecessarily will have most systems designed new from the ground up. Often times, the new systems are replacing old systems that had high levels of customer satisfaction or are transparent to the customer. The ESP/TMM project will not be a panacea that will solve all of the problems within the company. However, establishing, developing, and valuing technical depth is a critical core competency that Ford needs to strengthen to succeed in the future.

Looking outside the company, we would argue that there is a rich area of research into technical organizations that hasn't been tapped. There is not a great deal of work by outside researchers into what it takes to build and maintain a technical organization. After a couple of decades where early retirements, downsizing, and outsourcing were some of the most prominent buzzwords in the business world, we suspect that there are quite a few organizations that find themselves in situations similar to Ford. In addition, there are many small tech firms and organizations that have been sold off by their parent corporations that find their technical knowledge in the hands of a few, key individuals. Research on how to grow these organizations into learning, highly technical ones would be quite valuable.

Vision of the Future

If the ESP/TMM project is highly successful and technical competency becomes a core value of the company, it is important to a have a vision of how the organization will function. The existing organizational structure can be highly effective. One slight change would be to have the functional supervisors be tied to a single product platform versus being charge of certain commodities for an entire vehicle cluster. There have been situations in the new organization where future programs have been neglected in favor of supporting the launches of other programs. When a section is responsible for commodities on a single program, they can really understand its timing and get to identify with a vehicle and its

customer. Functional managers would still be responsible for functions across the entire vehicle cluster. This will allow the functional supervisors and engineers to frequently interact with people who are facing the same challenges on other products. This division of functional and product responsibilities will provide the best mix for success.

The goal for average experience among the engineers should be around five years. If this is met, most people in the organization have been through the complete product development cycle for at least one program. They would be in an ideal situation to really hone their skills and there would be plenty of avenues in which to learn. Once this level of experience and depth is reached, there should be some more rotation of personnel. The rotation of personnel should be to highly relevant cross-functional positions with the specific intent of eventually returning the engineers back to their area of core expertise. For example, a small percentage of body structures engineers should be rotated into the safety departments, vehicle engineering, and computer aided engineering departments. The length of rotation could still be relatively short (one to two years) and the focus of this cross-functional rotation should still be on body structures engineering. As the engineer is rotated back into the body structures engineering department, she will have a chance to practice and teach what she has learned on this assignment. With such an experienced staff, management should be able to pick and choose different critical competencies within each function that they need to further develop. Each function should have a series of classes that can be taught by the senior engineering community that will discuss the fundamentals of the engineering principles within the function. Classes that step through design guidelines could also be developed. Newer engineers would begin their careers in functional areas on programs that are smaller in size and from the middle of the program through launch. They will be mentored by more experienced members of the engineering community. After going through these

learning stages, they can be given the opportunity to work on large programs and further upstream in the development process.

It will probably take at least two product development cycles for an engineer to become proficient at a function. This proficiency level should be a minimum requirement for a senior engineer or a functional supervisor. With the full support of the company behind it, the technical career path will become much stronger and will have at least a few promotional levels within the company. Engineers should be encouraged and there should be enough rewards and recognition on either path. If the engineer decides to pursue neither track and is most content becoming increasingly knowledgeable in a certain functional area, this behavior should be encouraged. Engineers should be encouraged to find the area of the company will they think they will have the most impact and have the highest degree of job satisfaction. They will understand, however, that frequent moves to different functional areas will probably slow down their opportunities for promotion. The standard of technical proficiency will become a fairly rigid requirement.

The technical experts within the company will be highly recognized and respected. Their skills will be used on upfront and future product development. They will remain consultants for reviews of all programs during critical gateways as well as helping to resolve critical program issues. In addition, a group of these technical experts will devote some of their time to formally teaching other engineers and codifying the knowledge of the company.

The ITDP will evolve over time to facilitate the education of the employees. It will be used as frequently as the performance review and will have as much impact on promotions and personnel movement. The ITDP will also be used as a metric to track the technical depth and deficiencies in the department.

Ideally as designs become more standardized and robust as a result of the technically proficient workforce and the enforcement of good design practices, fewer engineering resources will be needed to go through the final development phases and the launch of vehicles. Again, this is reflected in Toyota's methods. They need fewer resources because of their commonization strategy and they re-use robust systems again and again – changing only what the customer directly perceives. This requires fewer engineers throughout the process, from initial design and release as well as for testing and verification to launch of the vehicle. Re-use reduces the need for component testing and should produce few issues at launch since the systems will have been verified time and time again on other programs. Thus, more resources can be focused on developing brand new technologies to be used in the future programs. This is truly the key to the success of the company.

Final Thoughts

The position that Ford finds itself in is obviously quite a difficult one, but it is not unique. Many other companies during the past decade also underwent significant cost cutting, out-sourcing, and downsizing. Ford was also not alone in stressing product platforms and elevating the concerns of the customer and shareholder to a driving force. We suspect that several other organizations both inside and outside the automotive industry are experiencing similar symptoms to the lack of technical proficiency seen at Ford at various stages and severities. It promises to be a significant organizational issue over the next few years as companies try to react to this problem. This organizational shift to outsourcing technical design and encouraging employees to be generalists only took a few years. Conversely, our literature review and research shows that shifting Ford's organization back to a technical focus will take enormous focused efforts over several years. Hopefully, our research not only describes the background and symptoms of the problems, but also several ways to begin addressing the biggest issues.

Ford Motor Company is at a critical juncture in its history. It finds itself in a very difficult environment competitively and economically. One of its biggest weaknesses is that technical proficiency is lacking across most of the company. Rebuilding this technical depth will take an incredible amount resources, time and effort. The problem that Ford is facing is that the system is so broken that it will take a long time before momentum behind the restoration to begins to build. With relatively long product development cycles and even longer product use cycles, the results to the company's bottom line are many years off. Ford Motor Company must remain patient in this timeframe and continue its strong support of programs like ESP/TMM. The best part about the difficulties of changing the culture in a large, complex organization is that once a positive one is established it will reap benefits for a long, long time.

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Appendix A

Toyota Benchmarking Survey Questions

1. What is the typical career path for an engineer at Toyota?
2. What is the typical career path for a manager at Toyota?
3. How does Toyota ensure that their engineers have sufficient technical depth?
4. Are there initiatives in place to support technical depth? Or is it built into its organizational structure and culture? Please elaborate.
5. Have you taken ESP (Experience and Stability Project) training?
6. Do you think that Ford's ESP (Experience and Stability Project) project will help Ford develop more technically proficient engineers? Why or why not?
7. What other actions would you suggest for Ford to support the technical development of our engineers?

Appendix B

SURVEY QUESTIONS FROM NOVEMBER 2002

ID	Question	Type
2797	What is your educational degree (choose the highest that applies)?	Multiple Choice
2949	How many years have you worked at Ford?	Multiple Choice
8487	What is your Salary Grade/Leadership Level?	Multiple Choice
9120	When did you first access the FLN system?	Multiple Choice
9174	What are you told is more important (generalist/technically deep)?	Multiple Choice
9175	What do you believe is more valued by the organization (generalist/technically deep)?	Multiple Choice
9179	Are you currently an FCG?	Yes/No
9181	Of which Body function are you a part?	Multiple Choice
9186	Do you belong to a Body Tech Club?	Yes/No
9187	In which organization do you work?	Multiple Choice
9109	I understand the need for technical maturity and engineering excellence within PD.	1-5 Range
9110	I understand the concepts and principles underlying ESP/TMM.	1-5 Range
9114	I believe that the use of ESP/TMM will strengthen technical career paths within PD.	1-5 Range
9113	I believe that using the TMM will enhance my department's overall engineering competency.	1-5 Range
9173	I believe the ESP/TMM project will strengthen my team's ability to meet business needs.	1-5 Range
9111	I know how to use the TMM as a framework for facilitating technical development.	1-5 Range
9112	I believe that using the TMM will enhance my technical depth with my functional area.	1-5 Range
9170	I believe that technical depth was adequately considered in recent reorganization decisions.	1-5 Range
9115	I believe that the ESP/TMM training was useful.	1-5 Range
9182	I believe that a functionally-based PDC5 will enhance my technical development.	1-5 Range
9178	Did you participate in the Body Engineering Pilot	Yes/No

	of Pilot? (June-August 2002)	
9169	Is technical depth/competence emphasized more today than it was at this time last year?	Yes/No
9172	Do you feel that you are able to coach or help a team member in their technical development?	Yes/No
9116	As a result of the ESP/TMM training, I have had a technical development discussion with my supervisor/manager.	Yes/No
9117	This technical development discussion was better than previous ones.	1-5 Range
9118	Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager	1-5 Range
9100	As a result of the ESP/TMM training, I have created a technical development plan.	Yes/No
9105	A discussion with my supervisor/manager.	Yes/No
9106	Interaction with my peers.	Yes/No
9107	Through use of the TMM as a framework for determining appropriate technical development activities.	Yes/No
9103	Through use of Ford Design Institute (FDI) resources.	Yes/No
9104	Through use of the Ford Learning Network (FLN) as an interface to the TMM.	Yes/No
9123	Through use of the FLM self-inventory data and resulting learning solutions.	Yes/No
9171	Are you implementing your ITDP (Individual Technical Development Plan)?	Yes/No
9176	Do you understand the linkage between your Tech Club and the TMM?	Yes/No

Appendix C

DEMOGRAPHIC RESULTS FROM NOVEMBER 2002 SURVEY

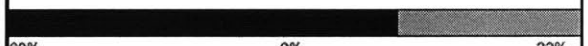
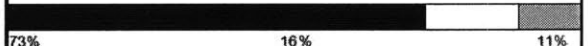
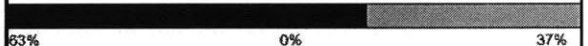
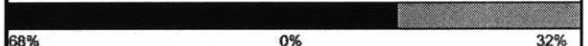
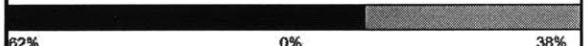
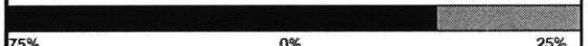
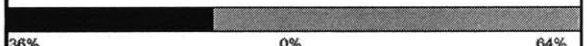
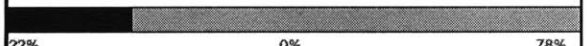
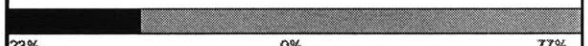
QUESTION	Number Responding	Pct of Total
2797. What is your educational degree? (choose the highest that applies)		
Bachelors	123	38
Masters	176	54
PhD	23	7
Other	5	2
2949. How many years have you worked at Ford?		
0-5 years	127	39
6-10 years	88	27
11-15 years	61	19
16-20 years	13	4
21-25 years	15	5
26-30 years	16	5
8487. What is your Salary Grade / Leadership Level?		
General Salary Roll (SG 1 - 8)	245	74
LL 6 (MR - Salary Grade 9 - 10)	70	21
LL 5 and above (Salary Grade 11 and above)	15	5
9120. When did you first access the FLN system?		
August	15	5
September	18	6
October	19	7
November	35	12
December	14	5
I have not used the system yet	177	61

QUESTION	Number Responding	Pct of Total
9174. What are you told is more important?		
Being a generalist	40	13
Being technically deep	279	87
9175. What do you believe is more valued by the organization?		
Being a generalist	129	40
Being technically deep	195	60
9179. Are you currently an FCG?		
Yes	13	4
No	313	96
9180. When were you hired at Ford?		
1999	1	8
2000	1	8
2001	7	54
2002	4	31
9181. Of which Body function are you a part?		
Body Structures	55	17
Closures	48	15
Exterior Systems	58	18
Interior Systems	49	15
Safety	62	19
Seats and Restraints	36	11
Other	17	5
9186. Do you belong to a Body Tech Club?		
Yes	55	17
No	273	83

QUESTION	Number Responding	Pct of Total
9187. With which organization are you most closely associated?		
Family Vehicle Line	45	14
Lifestyle Vehicle Line	60	18
Lincoln	52	16
NAE	7	2
Outfitters	76	23
Tough Trucks	79	24
Other	6	2

TOTAL RESULTS FROM NOVEMBER 2002 SURVEY

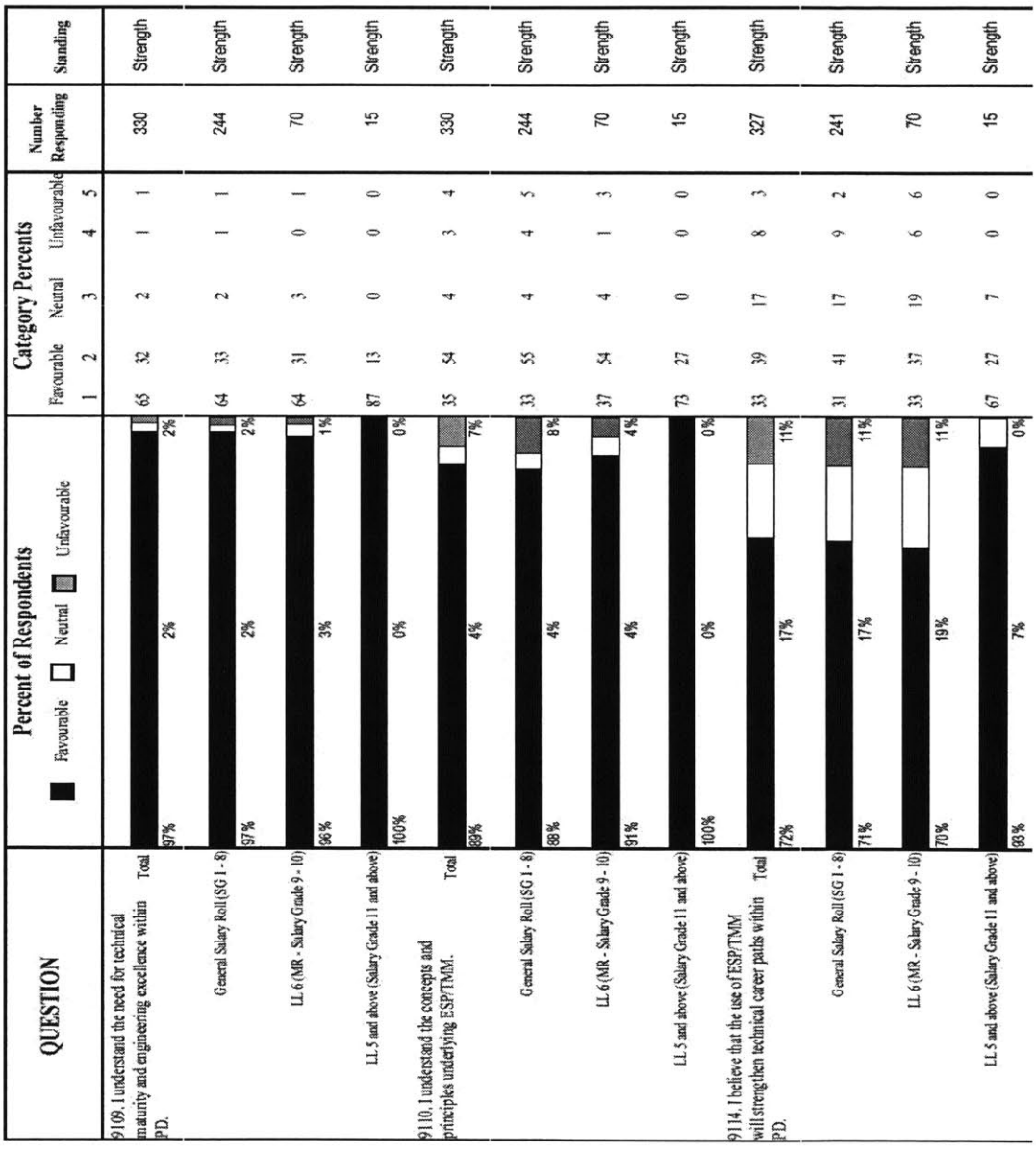
QUESTION	Percent of Respondents: Favourable	Neutral	Unfavourable	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9109. I understand the need for technical maturity and engineering excellence within PD.	97%	2%	2%	65	32	2	1	1	330	Strength
9110. I understand the concepts and principles underlying ESP/TMM.	89%	4%	7%	35	54	4	3	4	330	Strength
9114. I believe that the use of ESP/TMM will strengthen technical career paths within PD.	72%	17%	11%	33	39	17	8	3	327	Strength
9113. I believe that using the TMM will enhance my department's overall engineering competency.	77%	16%	8%	34	43	16	6	2	329	Strength
9173. I believe the ESP/TMM project will strengthen my team's ability to meet business needs.	71%	18%	12%	29	42	18	9	3	329	Strength
9111. I know how to use the TMM as a framework for facilitating technical development.	62%	22%	17%	17	45	22	12	5	327	Strength
9112. I believe that using the TMM will enhance my technical depth within my functional area.	68%	19%	13%	24	44	19	11	2	329	Strength
9170. I believe that technical depth was adequately considered in recent reorganization decisions.	37%	30%	33%	10	27	30	21	12	325	Weakness
9115. I believe that the ESP/TMM training was useful.	55%	29%	16%	12	43	29	10	6	326	Mixed
9182. I believe that a functionally-based PDC5 will enhance my technical development.	51%	36%	14%	13	38	36	9	4	236	Mixed
9178. Did you participate in the Body Engineering Pilot of Pilot? (June-August 2002)	49%	0%	51%	49	0	0	0	51	328	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9169. Is technical depth/competence emphasized more today than it was at this time last year?	 68% 0% 32%	68	0	0	0	32	324	Strength
9172. Do you feel that you are able to coach or help a team member in their technical development?	 71% 0% 29%	71	0	0	0	29	327	Strength
9116. As a result of the ESP/TMM training, I have had a technical development discussion with my supervisor/manager.	 53% 0% 47%	53	0	0	0	47	328	Mixed
9117. This technical development discussion was better than previous ones.	 61% 32% 7%	13	48	32	6	1	168	Strength
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager.	 73% 16% 11%	17	56	16	9	2	174	Strength
9100. As a result of the ESP/TMM training, I have created a technical development plan.	 63% 0% 37%	63	0	0	0	37	328	Strength
9105. A discussion with my supervisor/manager.	 68% 0% 32%	68	0	0	0	32	203	Strength
9106. Interactions with my peers.	 62% 0% 38%	62	0	0	0	38	202	Strength
9107. Through use of the TMM as a framework for determining appropriate technical development activities.	 75% 0% 25%	75	0	0	0	25	200	Strength
9103. Through use of Ford Design Institute (FDI) resources.	 36% 0% 64%	36	0	0	0	64	200	Weakness
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM.	 22% 0% 78%	22	0	0	0	78	199	Weakness
9123. Through use of the FLN self-inventory data and resulting learning solutions.	 23% 0% 77%	23	0	0	0	77	199	Weakness

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9171. Are you implementing your ITDP (Individual Technical Development Plan)?	 84% 0% 16%	84	0	0	0	16	204	Strength
9176. Do you understand the linkage between your Tech Club and the TMM?	 61% 0% 39%	61	0	0	0	39	54	Strength

Appendix E

NOVEMBER 2002 RESPONSES BY SALARY GRADE/LEADERSHIP LEVEL



QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents 1	2	3	4	5	Number Responding	Standing
		Favourable		Neutral	Unfavourable			
9113. I believe that using the TMM will enhance my department's overall engineering competency. Total	77% / 16% / 8%	34	43	16	6	2	329	Strength
General Salary Roll (SG 1 - 8)	76% / 16% / 8%	32	44	16	6	2	243	Strength
LL 6 (MR - Salary Grade 9 - 10)	74% / 16% / 10%	34	40	16	6	4	70	Strength
LL 5 and above (Salary Grade 11 and above)	100% / 0% / 0%	67	33	0	0	0	15	Strength
9173. I believe the ESP/TMM project will strengthen my team's ability to meet business needs. Total	71% / 18% / 12%	29	42	18	9	3	329	Strength
General Salary Roll (SG 1 - 8)	70% / 19% / 12%	28	42	19	9	3	243	Strength
LL 6 (MR - Salary Grade 9 - 10)	69% / 17% / 14%	29	40	17	10	4	70	Strength
LL 5 and above (Salary Grade 11 and above)	93% / 7% / 0%	53	40	7	0	0	15	Strength
9111. I know how to use the TMM as a framework for facilitating technical development. Total	62% / 22% / 17%	17	45	22	12	5	327	Strength
General Salary Roll (SG 1 - 8)	61% / 22% / 17%	15	46	22	12	5	241	Strength
LL 6 (MR - Salary Grade 9 - 10)	57% / 23% / 20%	17	40	23	14	6	70	Mixed
LL 5 and above (Salary Grade 11 and above)	87% / 13% / 0%	47	40	13	0	0	15	Strength
9112. I believe that using the TMM will enhance my technical depth within my functional area. Total	68% / 19% / 13%	24	44	19	11	2	329	Strength
General Salary Roll (SG 1 - 8)	68% / 20% / 12%	26	42	20	10	2	243	Strength

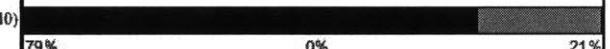
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
LL 6 (MR - Salary Grade 9 - 10)	63% / 19% / 19%	17	46	19	14	4	70	Strength
LL 5 and above (Salary Grade 11 and above)	93% / 7% / 0%	33	60	7	0	0	15	Strength
9170. I believe that technical depth was adequately considered in recent reorganization decisions. Total	37% / 30% / 33%	10	27	30	21	12	325	Weakness
General Salary Roll (SG 1 - 8)	37% / 33% / 30%	11	26	33	20	10	240	Weakness
LL 6 (MR - Salary Grade 9 - 10)	28% / 23% / 49%	6	22	23	29	20	69	Weakness
LL 5 and above (Salary Grade 11 and above)	73% / 13% / 13%	7	67	13	13	0	15	Strength
9115. I believe that the ESP/TMM training was useful. Total	55% / 29% / 16%	12	43	29	10	6	326	Mixed
General Salary Roll (SG 1 - 8)	53% / 30% / 18%	11	42	30	10	8	240	Mixed
LL 6 (MR - Salary Grade 9 - 10)	56% / 29% / 16%	11	44	29	11	4	70	Mixed
LL 5 and above (Salary Grade 11 and above)	87% / 13% / 0%	33	53	13	0	0	15	Strength
9182. I believe that a functionally-based PDC5 will enhance my technical development. Total	51% / 36% / 14%	13	38	36	9	4	236	Mixed
General Salary Roll (SG 1 - 8)	51% / 36% / 14%	13	38	36	9	4	236	Mixed
9178. Did you participate in the Body Engineering Pilot of Pilot? (June-August 2002) Total	49% / 0% / 51%	49	0	0	0	51	328	Mixed
General Salary Roll (SG 1 - 8)	46% / 0% / 54%	46	0	0	0	54	242	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
LL 6 (MR - Salary Grade 9 - 10)	59% / 0% / 41%	59	0	0	0	41	70	Mixed
LL 5 and above (Salary Grade 11 and above)	47% / 0% / 53%	47	0	0	0	53	15	Mixed
9169. Is technical depth/competence emphasized more today than it was at this time last year? Total	68% / 0% / 32%	68	0	0	0	32	324	Strength
General Salary Roll (SG 1 - 8)	68% / 0% / 32%	68	0	0	0	32	239	Strength
LL 6 (MR - Salary Grade 9 - 10)	67% / 0% / 33%	67	0	0	0	33	70	Strength
LL 5 and above (Salary Grade 11 and above)	79% / 0% / 21%	79	0	0	0	21	14	Strength
9172. Do you feel that you are able to coach or help a team member in their technical development? Total	71% / 0% / 29%	71	0	0	0	29	327	Strength
General Salary Roll (SG 1 - 8)	67% / 0% / 33%	67	0	0	0	33	241	Strength
LL 6 (MR - Salary Grade 9 - 10)	79% / 0% / 21%	79	0	0	0	21	70	Strength
LL 5 and above (Salary Grade 11 and above)	93% / 0% / 7%	93	0	0	0	7	15	Strength
9116. As a result of the ESP/TMM training, I have had a technical development discussion with my supervisor/manager. Total	53% / 0% / 47%	53	0	0	0	47	328	Mixed
General Salary Roll (SG 1 - 8)	55% / 0% / 45%	55	0	0	0	45	242	Mixed
LL 6 (MR - Salary Grade 9 - 10)	51% / 0% / 49%	51	0	0	0	49	70	Mixed
LL 5 and above (Salary Grade 11 and above)	27% / 0% / 73%	27	0	0	0	73	15	Weakness

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9117. This technical development discussion was better than previous ones. Total	61% / 32% / 7%	13	48	32	6	1	168	Strength
General Salary Roll (SG 1 - 8)	64% / 30% / 6%	12	52	30	5	2	127	Strength
LL 6 (MR - Salary Grade 9 - 10)	53% / 36% / 11%	14	39	36	11	0	36	Mixed
LL 5 and above (Salary Grade 11 and above)							4	Insufficient Data
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager. Total	73% / 16% / 11%	17	56	16	9	2	174	Strength
General Salary Roll (SG 1 - 8)	75% / 15% / 10%	17	59	15	8	2	133	Strength
LL 6 (MR - Salary Grade 9 - 10)	67% / 17% / 17%	17	50	17	11	6	36	Strength
LL 5 and above (Salary Grade 11 and above)							4	Insufficient Data
9100. As a result of the ESP/TMM training, I have created a technical development plan. Total	63% / 0% / 37%	63	0	0	0	37	328	Strength
General Salary Roll (SG 1 - 8)	64% / 0% / 36%	64	0	0	0	36	241	Strength
LL 6 (MR - Salary Grade 9 - 10)	59% / 0% / 41%	59	0	0	0	41	70	Mixed
LL 5 and above (Salary Grade 11 and above)	60% / 0% / 40%	60	0	0	0	40	15	Strength
9105. A discussion with my supervisor/manager. Total	68% / 0% / 32%	68	0	0	0	32	203	Strength
General Salary Roll (SG 1 - 8)	71% / 0% / 29%	71	0	0	0	29	153	Strength

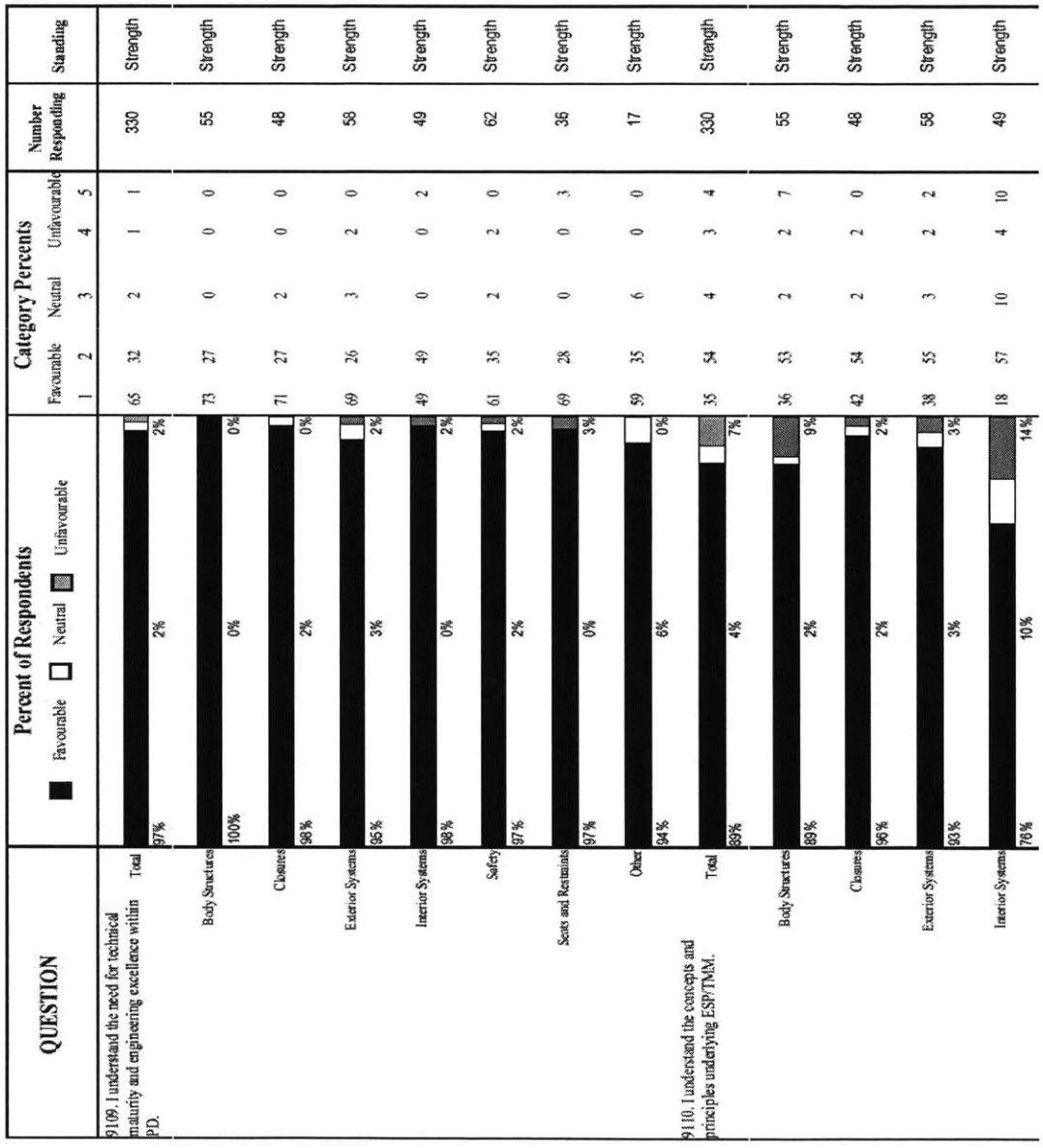
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
LL 6 (MR - Salary Grade 9 - 10)	61% / 0% / 39%	61	0	0	0	39	41	Strength
LL 5 and above (Salary Grade 11 and above)	44% / 0% / 56%	44	0	0	0	56	9	Mixed
9106. Interactions with my peers. Total	62% / 0% / 38%	62	0	0	0	38	202	Strength
General Salary Roll (SG 1 - 8)	61% / 0% / 39%	61	0	0	0	39	152	Strength
LL 6 (MR - Salary Grade 9 - 10)	63% / 0% / 37%	63	0	0	0	37	41	Strength
LL 5 and above (Salary Grade 11 and above)	78% / 0% / 22%	78	0	0	0	22	9	Strength
9107. Through use of the TMM as a framework for determining appropriate technical development activities. Total	75% / 0% / 25%	75	0	0	0	25	200	Strength
General Salary Roll (SG 1 - 8)	74% / 0% / 26%	74	0	0	0	26	151	Strength
LL 6 (MR - Salary Grade 9 - 10)	75% / 0% / 25%	75	0	0	0	25	40	Strength
LL 5 and above (Salary Grade 11 and above)	100% / 0% / 0%	100	0	0	0	0	9	Strength
9103. Through use of Ford Design Institute (FDI) resources. Total	36% / 0% / 64%	36	0	0	0	64	200	Weakness
General Salary Roll (SG 1 - 8)	37% / 0% / 63%	37	0	0	0	63	151	Weakness
LL 6 (MR - Salary Grade 9 - 10)	30% / 0% / 70%	30	0	0	0	70	40	Weakness
LL 5 and above (Salary Grade 11 and above)	44% / 0% / 56%	44	0	0	0	56	9	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM. Total	22% / 0% / 78%	22	0	0	0	78	199	Weakness
General Salary Roll (SG 1 - 8)	23% / 0% / 77%	23	0	0	0	77	150	Weakness
LL 6 (MR - Salary Grade 9 - 10)	15% / 0% / 85%	15	0	0	0	85	40	Weakness
LL 5 and above (Salary Grade 11 and above)	22% / 0% / 78%	22	0	0	0	78	9	Weakness
9123. Through use of the FLN self-inventory data and resulting learning solutions. Total	23% / 0% / 77%	23	0	0	0	77	199	Weakness
General Salary Roll (SG 1 - 8)	25% / 0% / 75%	25	0	0	0	75	150	Weakness
LL 6 (MR - Salary Grade 9 - 10)	18% / 0% / 83%	18	0	0	0	83	40	Weakness
LL 5 and above (Salary Grade 11 and above)	22% / 0% / 78%	22	0	0	0	78	9	Weakness
9171. Are you implementing your ITDP (Individual Technical Development Plan)? Total	84% / 0% / 16%	84	0	0	0	16	204	Strength
General Salary Roll (SG 1 - 8)	85% / 0% / 15%	85	0	0	0	15	154	Strength
LL 6 (MR - Salary Grade 9 - 10)	78% / 0% / 23%	78	0	0	0	23	40	Strength
LL 5 and above (Salary Grade 11 and above)	100% / 0% / 0%	100	0	0	0	0	9	Strength
9176. Do you understand the linkage between your Tech Club and the TMM? Total	61% / 0% / 39%	61	0	0	0	39	54	Strength
General Salary Roll (SG 1 - 8)	45% / 0% / 55%	45	0	0	0	55	29	Mixed

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
LL 6 (MR - Salary Grade 9 - 10)	 79% 0% 21%	79	0	0	0	21	14	Strength
LL 5 and above (Salary Grade 11 and above)	 80% 0% 20%	80	0	0	0	20	10	Strength

Appendix F

NOVEMBER 2002 RESPONSES BY BODY FUNCTION



QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents 1	2	3	4	5	Number Responding	Standing
9114. I believe that the use of ESP/TMM will strengthen technical career paths within PD. — Safety	92% / 2% / 6%	35	56	2	5	2	62	Strength
Seats and Restraints	94% / 0% / 6%	39	56	0	0	6	36	Strength
Other	88% / 0% / 12%	53	35	0	12	0	17	Strength
Total	72% / 17% / 11%	33	39	17	8	3	327	Strength
Body Structures	81% / 9% / 9%	34	47	9	8	2	53	Strength
Closures	79% / 15% / 6%	42	38	15	4	2	48	Strength
Exterior Systems	64% / 31% / 5%	22	41	31	3	2	58	Strength
Interior Systems	71% / 20% / 8%	27	45	20	8	0	49	Strength
Safety	67% / 15% / 18%	33	34	15	11	7	61	Strength
Seats and Restraints	83% / 3% / 14%	42	42	3	8	6	36	Strength
Other	65% / 24% / 12%	47	18	24	12	0	17	Strength
9113. I believe that using the TMM will enhance my department's overall engineering competency. — Total	77% / 16% / 8%	34	43	16	6	2	329	Strength
Body Structures	83% / 7% / 9%	43	41	7	7	2	54	Strength
Closures	90% / 8% / 2%	42	48	8	2	0	48	Strength

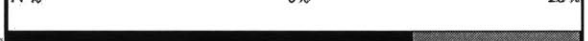
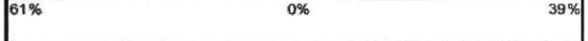
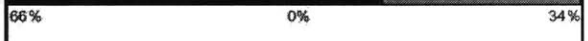
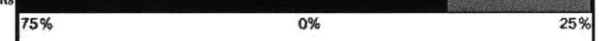
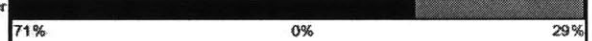
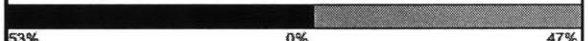
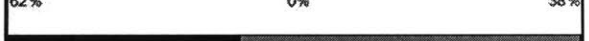
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9173. I believe the ESP/TMM project will strengthen my team's ability to meet business needs. — Exterior Systems	74% / 21% / 5%	24	50	21	3	2	58	Strength
Interior Systems	71% / 20% / 8%	24	47	20	8	0	49	Strength
Safety	66% / 19% / 15%	26	40	19	8	6	62	Strength
Seats and Restraints	89% / 6% / 6%	47	42	6	3	3	36	Strength
Other	65% / 24% / 12%	53	12	24	12	0	17	Strength
Total	71% / 18% / 12%	29	42	18	9	3	329	Strength
Body Structures	80% / 9% / 11%	43	37	9	9	2	54	Strength
Closures	77% / 19% / 4%	35	42	19	4	0	48	Strength
Exterior Systems	69% / 21% / 10%	16	53	21	7	3	58	Strength
Interior Systems	67% / 24% / 8%	16	51	24	8	0	49	Strength
Safety	61% / 21% / 18%	21	40	21	11	6	62	Strength
Seats and Restraints	83% / 8% / 8%	42	42	8	6	3	36	Strength
Other	65% / 12% / 24%	59	6	12	18	6	17	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents 1	2	3	4	5	Number Responding	Standing
		Favourable		Neutral	Unfavourable			
9111. I know how to use the TMM as a framework for facilitating technical development. Total	62% / 22% / 17%	17	45	22	12	5	327	Strength
Body Structures	67% / 19% / 15%	24	43	19	9	6	54	Strength
Closures	77% / 13% / 11%	26	51	13	11	0	47	Strength
Exterior Systems	53% / 29% / 17%	12	41	29	14	3	58	Mixed
Interior Systems	57% / 20% / 22%	12	45	20	14	8	49	Mixed
Safety	53% / 27% / 19%	5	48	27	15	5	62	Mixed
Seats and Restraints	69% / 17% / 14%	26	43	17	9	6	35	Strength
Other	71% / 12% / 18%	29	41	12	12	6	17	Strength
9112. I believe that using the TMM will enhance my technical depth within my functional area. Total	68% / 19% / 13%	24	44	19	11	2	329	Strength
Body Structures	65% / 17% / 19%	24	41	17	11	7	54	Strength
Closures	73% / 19% / 8%	33	40	19	8	0	48	Strength
Exterior Systems	71% / 21% / 9%	19	52	21	7	2	58	Strength
Interior Systems	65% / 22% / 12%	22	43	22	12	0	49	Strength
Safety	61% / 21% / 18%	21	40	21	15	3	62	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9170. I believe that technical depth was adequately considered in recent reorganization decisions. — Seats and Restraints	83% / 8% / 8%	28	56	8	6	3	36	Strength
Other	65% / 18% / 18%	24	41	18	18	0	17	Strength
Total	37% / 30% / 33%	10	27	30	21	12	325	Weakness
Body Structures	35% / 29% / 35%	10	25	29	20	16	51	Weakness
Closures	43% / 30% / 28%	21	21	30	19	9	47	Mixed
Exterior Systems	36% / 26% / 38%	5	31	26	29	9	58	Weakness
Interior Systems	37% / 37% / 27%	12	24	37	10	16	49	Weakness
Safety	31% / 35% / 34%	5	26	35	19	15	62	Weakness
9115. I believe that the ESP/TMM training was useful. — Seats and Restraints	44% / 22% / 33%	11	33	22	25	8	36	Mixed
Other	47% / 24% / 29%	6	41	24	24	6	17	Mixed
Total	55% / 29% / 16%	12	43	29	10	6	326	Mixed
Body Structures	60% / 21% / 19%	17	43	21	8	11	53	Strength
Closures	71% / 17% / 13%	15	56	17	8	4	48	Strength
Exterior Systems	52% / 34% / 14%	10	41	34	9	5	58	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9182. I believe that a functionally-based PDC5 will enhance my technical development.								
Interior Systems	46% / 38% / 17%	13	33	38	13	4	48	Mixed
Safety	52% / 26% / 21%	8	44	26	11	10	61	Mixed
Seats and Restraints	50% / 39% / 11%	17	33	39	6	6	36	Mixed
Other	65% / 18% / 18%	6	59	18	18	0	17	Strength
Total	51% / 36% / 14%	13	38	36	9	4	236	Mixed
9178. Did you participate in the Body Engineering Pilot of Pilot? (June-August 2002)								
Body Structures	58% / 27% / 15%	18	39	27	6	9	33	Mixed
Closures	61% / 28% / 11%	19	42	28	8	3	36	Strength
Exterior Systems	51% / 35% / 14%	14	38	35	11	3	37	Mixed
Interior Systems	61% / 31% / 8%	17	44	31	3	6	36	Strength
Safety	42% / 40% / 17%	6	37	40	12	6	52	Mixed
Seats and Restraints	41% / 50% / 9%	13	28	50	9	0	32	Mixed
Other	38% / 38% / 25%	0	38	38	25	0	8	Weakness
Total	49% / 0% / 51%	49	0	0	0	51	328	Mixed
Body Structures	43% / 0% / 57%	43	0	0	0	57	54	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9169. Is technical depth/competence emphasized more today than it was at this time last year? — Closures	56% / 0% / 44%	56	0	0	0	44	48	Mixed
Exterior Systems	53% / 0% / 47%	53	0	0	0	47	58	Mixed
Interior Systems	37% / 0% / 63%	37	0	0	0	63	49	Weakness
Safety	56% / 0% / 44%	56	0	0	0	44	61	Mixed
Seats and Restraints	39% / 0% / 61%	39	0	0	0	61	36	Weakness
Other	53% / 0% / 47%	53	0	0	0	47	17	Mixed
Total	68% / 0% / 32%	68	0	0	0	32	324	Strength
Body Structures	59% / 0% / 41%	59	0	0	0	41	54	Mixed
Closures	79% / 0% / 21%	79	0	0	0	21	47	Strength
Exterior Systems	76% / 0% / 24%	76	0	0	0	24	58	Strength
Interior Systems	57% / 0% / 43%	57	0	0	0	43	46	Mixed
Safety	67% / 0% / 33%	67	0	0	0	33	61	Strength
Seats and Restraints	72% / 0% / 28%	72	0	0	0	28	36	Strength
Other	76% / 0% / 24%	76	0	0	0	24	17	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9172. Do you feel that you are able to coach or help a team member in their technical development? — Total	 71% / 0% / 29%	71	0	0	0	29	327	Strength
Body Structures	 78% / 0% / 22%	78	0	0	0	22	55	Strength
Closures	 77% / 0% / 23%	77	0	0	0	23	47	Strength
Exterior Systems	 71% / 0% / 29%	71	0	0	0	29	58	Strength
Interior Systems	 61% / 0% / 39%	61	0	0	0	39	49	Strength
Safety	 66% / 0% / 34%	66	0	0	0	34	61	Strength
Seats and Restraints	 75% / 0% / 25%	75	0	0	0	25	36	Strength
Other	 71% / 0% / 29%	71	0	0	0	29	17	Strength
9116. As a result of the ESP/TMM training, I have had a technical development discussion with my supervisor/manager. — Total	 53% / 0% / 47%	53	0	0	0	47	328	Mixed
Body Structures	 64% / 0% / 36%	64	0	0	0	36	55	Strength
Closures	 57% / 0% / 43%	57	0	0	0	43	47	Mixed
Exterior Systems	 62% / 0% / 38%	62	0	0	0	38	58	Strength
Interior Systems	 41% / 0% / 59%	41	0	0	0	59	49	Mixed
Safety	 56% / 0% / 44%	56	0	0	0	44	62	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9117. This technical development discussion was better than previous ones. — Seats and Restraints	47% / 0% / 53%	47	0	0	0	53	36	Mixed
Other	18% / 0% / 82%	18	0	0	0	82	17	Weakness
Total	61% / 32% / 7%	13	48	32	6	1	168	Strength
Body Structures	78% / 16% / 6%	25	53	16	3	3	32	Strength
Closures	73% / 27% / 0%	8	65	27	0	0	26	Strength
Exterior Systems	43% / 43% / 14%	3	40	43	11	3	35	Mixed
Interior Systems	55% / 40% / 5%	10	45	40	5	0	20	Mixed
Safety	59% / 35% / 6%	18	41	35	6	0	34	Mixed
Seats and Restraints	63% / 25% / 13%	19	44	25	13	0	16	Strength
Other							3	Insufficient Data
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager. — Total	73% / 16% / 11%	17	56	16	9	2	174	Strength
Body Structures	76% / 15% / 9%	21	56	15	3	6	34	Strength
Closures	96% / 4% / 0%	26	70	4	0	0	27	Strength
Exterior Systems	69% / 11% / 19%	3	67	11	14	6	36	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents 1	2	3	4	5	Number Responding	Standing
9100. As a result of the ESP/TMM training, I have created a technical development plan.		Favourable		Neutral	Unfavourable			
Interior Systems	55% / 30% / 15%	10	45	30	15	0	20	Mixed
Safety	66% / 23% / 11%	23	43	23	11	0	35	Strength
Seats and Restraints	82% / 12% / 6%	29	53	12	6	0	17	Strength
Other							3	Insufficient Data
Total	63% / 0% / 37%	63	0	0	0	37	328	Strength
9105. A discussion with my supervisor/manager.								
Body Structures	60% / 0% / 40%	60	0	0	0	40	55	Strength
Closures	63% / 0% / 37%	63	0	0	0	37	46	Strength
Exterior Systems	71% / 0% / 29%	71	0	0	0	29	58	Strength
Interior Systems	59% / 0% / 41%	59	0	0	0	41	49	Mixed
Safety	79% / 0% / 21%	79	0	0	0	21	62	Strength
Seats and Restraints	56% / 0% / 44%	56	0	0	0	44	36	Mixed
Other	6% / 0% / 94%	6	0	0	0	94	17	Weakness
Total	68% / 0% / 32%	68	0	0	0	32	203	Strength
Body Structures	72% / 0% / 28%	72	0	0	0	28	32	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9106. Interactions with my peers.								
Closures	83% / 0% / 17%	83	0	0	0	17	29	Strength
Exterior Systems	68% / 0% / 32%	68	0	0	0	32	41	Strength
Interior Systems	55% / 0% / 45%	55	0	0	0	45	29	Mixed
Safety	65% / 0% / 35%	65	0	0	0	35	48	Strength
Seats and Restraints	60% / 0% / 40%	60	0	0	0	40	20	Strength
Other							1	Insufficient Data
Total	62% / 0% / 38%	62	0	0	0	38	202	Strength
Body Structures	61% / 0% / 39%	61	0	0	0	39	33	Strength
Closures	75% / 0% / 25%	75	0	0	0	25	28	Strength
Exterior Systems	63% / 0% / 38%	63	0	0	0	38	40	Strength
Interior Systems	55% / 0% / 45%	55	0	0	0	45	29	Mixed
Safety	65% / 0% / 35%	65	0	0	0	35	48	Strength
Seats and Restraints	50% / 0% / 50%	50	0	0	0	50	20	Mixed
Other							1	Insufficient Data

QUESTION	Percent of Respondents (■ Favourable □ Neutral ▨ Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9107. Through use of the TMM as a framework for determining appropriate technical development activities.								
Total	75% 0% 25%	75	0	0	0	25	200	Strength
Body Structures	75% 0% 25%	75	0	0	0	25	32	Strength
Closures	75% 0% 25%	75	0	0	0	25	28	Strength
Exterior Systems	71% 0% 29%	71	0	0	0	29	41	Strength
Interior Systems	86% 0% 14%	86	0	0	0	14	29	Strength
Safety	72% 0% 28%	72	0	0	0	28	47	Strength
Seats and Restraints	68% 0% 32%	68	0	0	0	32	19	Strength
Other							1	Insufficient Data
9103. Through use of Ford Design Institute (FDI) resources.								
Total	36% 0% 64%	36	0	0	0	64	200	Weakness
Body Structures	39% 0% 61%	39	0	0	0	61	33	Weakness
Closures	52% 0% 48%	52	0	0	0	48	27	Mixed
Exterior Systems	35% 0% 65%	35	0	0	0	65	40	Weakness
Interior Systems	46% 0% 54%	46	0	0	0	54	28	Mixed
Safety	27% 0% 73%	27	0	0	0	73	48	Weakness

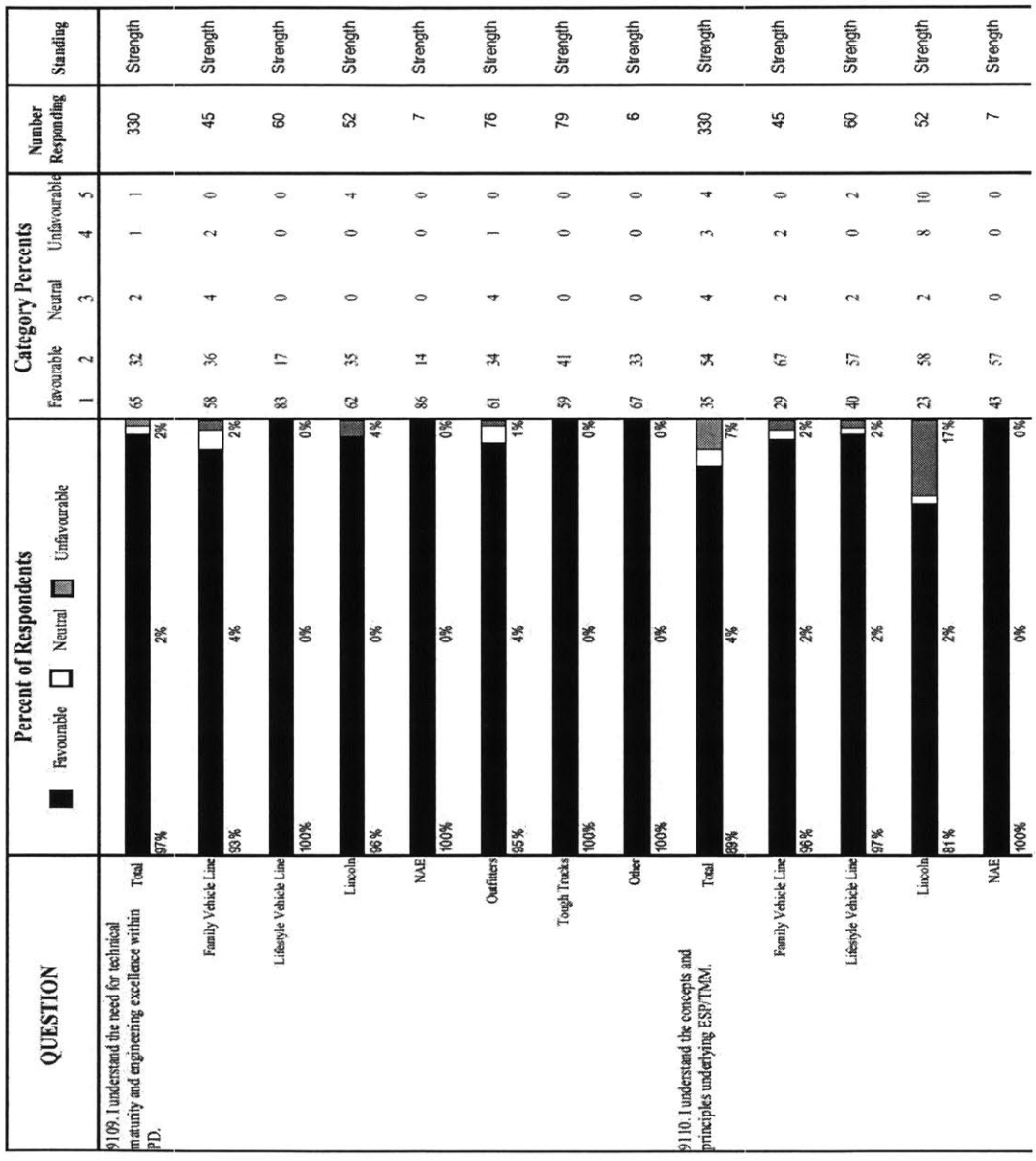
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM. — Seats and Restraints	25% / 0% / 75%	25	0	0	0	75	20	Weakness
Other							1	Insufficient Data
Total	22% / 0% / 78%	22	0	0	0	78	199	Weakness
Body Structures	22% / 0% / 78%	22	0	0	0	78	32	Weakness
Closures	25% / 0% / 75%	25	0	0	0	75	28	Weakness
Exterior Systems	15% / 0% / 85%	15	0	0	0	85	40	Weakness
Interior Systems	29% / 0% / 71%	29	0	0	0	71	28	Weakness
Safety	19% / 0% / 81%	19	0	0	0	81	47	Weakness
9123. Through use of the FLN self-inventory data and resulting learning solutions. — Seats and Restraints	30% / 0% / 70%	30	0	0	0	70	20	Weakness
Other							1	Insufficient Data
Total	23% / 0% / 77%	23	0	0	0	77	199	Weakness
Body Structures	19% / 0% / 81%	19	0	0	0	81	32	Weakness
Closures	22% / 0% / 78%	22	0	0	0	78	27	Weakness
Exterior Systems	23% / 0% / 78%	23	0	0	0	78	40	Weakness

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
Interior Systems	29% / 0% / 71%	29	0	0	0	71	28	Weakness
Safety	23% / 0% / 77%	23	0	0	0	77	48	Weakness
Seats and Restraints	25% / 0% / 75%	25	0	0	0	75	20	Weakness
Other							1	Insufficient Data
9171. Are you implementing your ITDP (Individual Technical Development Plan)? Total	84% / 0% / 16%	84	0	0	0	16	204	Strength
Body Structures	82% / 0% / 18%	82	0	0	0	18	33	Strength
Closures	93% / 0% / 7%	93	0	0	0	7	28	Strength
Exterior Systems	85% / 0% / 15%	85	0	0	0	15	41	Strength
Interior Systems	89% / 0% / 11%	89	0	0	0	11	28	Strength
Safety	84% / 0% / 16%	84	0	0	0	16	49	Strength
Seats and Restraints	75% / 0% / 25%	75	0	0	0	25	20	Strength
Other							1	Insufficient Data
9176. Do you understand the linkage between your Tech Club and the TMM? Total	61% / 0% / 39%	61	0	0	0	39	54	Strength
Body Structures	63% / 0% / 38%	63	0	0	0	38	8	Strength

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
Closures	 50% 0% 50%	50	0	0	0	50	14	Mixed
Exterior Systems	 57% 0% 43%	57	0	0	0	43	14	Mixed
Interior Systems	 100% 0% 0%	100	0	0	0	0	5	Strength
Safety	 80% 0% 20%	80	0	0	0	20	5	Strength
Seats and Restraints							4	Insufficient Data
Other							2	Insufficient Data

Appendix G

NOVEMBER 2002 RESPONSES BY ORGANIZATION



QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9114. I believe that the use of ESP/TMM will strengthen technical career paths within PD. — Outfitters	87% / 4% / 9%	46	41	4	4	5	76	Strength
Tough Trucks	89% / 5% / 6%	35	53	5	3	4	79	Strength
Other	100% / 0% / 0%	33	67	0	0	0	6	Strength
Total	72% / 17% / 11%	33	39	17	8	3	327	Strength
Family Vehicle Line	64% / 16% / 20%	24	40	16	18	2	45	Strength
Lifestyle Vehicle Line	80% / 12% / 8%	33	47	12	5	3	60	Strength
Lincoln	75% / 18% / 8%	33	41	18	6	2	51	Strength
NAE	86% / 0% / 14%	14	71	0	14	0	7	Strength
9113. I believe that using the TMM will enhance my department's overall engineering competency. — Outfitters	75% / 16% / 9%	41	33	16	4	5	75	Strength
Tough Trucks	71% / 22% / 8%	33	37	22	6	1	78	Strength
Other	67% / 17% / 17%	33	33	17	17	0	6	Strength
Total	77% / 16% / 8%	34	43	16	6	2	329	Strength
Family Vehicle Line	76% / 13% / 11%	31	44	13	9	2	45	Strength
Lifestyle Vehicle Line	88% / 7% / 5%	38	50	7	2	3	60	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9173. I believe the ESP/TMM project will strengthen my team's ability to meet business needs. — Lincoln	79% / 13% / 8%	33	46	13	6	2	52	Strength
NAE	86% / 0% / 14%	14	71	0	14	0	7	Strength
Outfitters	75% / 17% / 8%	43	32	17	5	3	75	Strength
Tough Trucks	72% / 20% / 8%	30	42	20	6	1	79	Strength
Other	67% / 17% / 17%	17	50	17	17	0	6	Strength
Total	71% / 18% / 12%	29	42	18	9	3	329	Strength
Family Vehicle Line	62% / 24% / 13%	29	33	24	11	2	45	Strength
Lifestyle Vehicle Line	80% / 13% / 7%	25	55	13	3	3	60	Strength
Lincoln	77% / 13% / 10%	29	48	13	8	2	52	Strength
NAE	86% / 0% / 14%	29	57	0	14	0	7	Strength
Outfitters	71% / 16% / 13%	33	37	16	9	4	75	Strength
Tough Trucks	67% / 22% / 11%	30	37	22	9	3	79	Strength
Other	83% / 0% / 17%	33	50	0	17	0	6	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9111. I know how to use the TMM as a framework for facilitating technical development. — Total	62% / 22% / 17%	17	45	22	12	5	327	Strength
Family Vehicle Line	64% / 14% / 23%	16	48	14	20	2	44	Strength
Lifestyle Vehicle Line	61% / 24% / 15%	12	49	24	12	3	59	Strength
Lincoln	45% / 29% / 25%	10	35	29	16	10	51	Mixed
NAE	57% / 29% / 14%	14	43	29	14	0	7	Mixed
Outfitters	68% / 17% / 14%	24	45	17	9	5	76	Strength
Tough Trucks	66% / 22% / 13%	20	46	22	9	4	79	Strength
Other	83% / 17% / 0%	17	67	17	0	0	6	Strength
9112. I believe that using the TMM will enhance my technical depth within my functional area. — Total	68% / 19% / 13%	24	44	19	11	2	329	Strength
Family Vehicle Line	69% / 13% / 18%	16	53	13	18	0	45	Strength
Lifestyle Vehicle Line	72% / 20% / 8%	22	50	20	5	3	60	Strength
Lincoln	69% / 17% / 13%	12	58	17	12	2	52	Strength
NAE	100% / 0% / 0%	29	71	0	0	0	7	Strength
Outfitters	72% / 15% / 13%	41	31	15	12	1	75	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9170. I believe that technical depth was adequately considered in recent reorganization decisions.	Tough Trucks 62% / 25% / 13%	24	38	25	9	4	79	Strength
	Other 50% / 17% / 33%	17	33	17	17	17	6	Mixed
	Total 37% / 30% / 33%	10	27	30	21	12	325	Weakness
	Family Vehicle Line 41% / 32% / 27%	9	32	32	14	14	44	Mixed
	Lifestyle Vehicle Line 31% / 27% / 42%	3	27	27	27	15	59	Weakness
	Lincoln 31% / 43% / 25%	6	25	43	16	10	51	Weakness
	NAE 29% / 43% / 29%	0	29	43	29	0	7	Weakness
	Outfitters 43% / 19% / 39%	15	28	19	25	13	75	Mixed
	Tough Trucks 43% / 30% / 27%	15	28	30	18	9	79	Mixed
	Other 0% / 60% / 40%	0	0	60	20	20	5	Weakness
9115. I believe that the ESP/TMM training was useful.	Total 55% / 29% / 16%	12	43	29	10	6	326	Mixed
	Family Vehicle Line 60% / 16% / 24%	13	47	16	16	9	45	Strength
	Lifestyle Vehicle Line 55% / 28% / 17%	5	50	28	10	7	60	Mixed
	Lincoln 39% / 49% / 12%	8	31	49	4	8	51	Weakness

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9182. I believe that a functionally-based PDC5 will enhance my technical development.								
NAE	29% / 57% / 14%	14	14	57	0	14	7	Weakness
Outfitters	61% / 23% / 16%	20	41	23	9	7	75	Strength
Tough Trucks	61% / 25% / 14%	14	47	25	10	4	77	Strength
Other	67% / 17% / 17%	0	67	17	17	0	6	Strength
Total	51% / 36% / 14%	13	38	36	9	4	236	Mixed
Family Vehicle Line	45% / 42% / 12%	6	39	42	9	3	33	Mixed
Lifestyle Vehicle Line	51% / 37% / 12%	7	44	37	7	5	43	Mixed
Lincoln	45% / 45% / 9%	9	36	45	6	3	33	Mixed
NAE	33% / 67% / 0%	0	33	67	0	0	6	Weakness
Outfitters	55% / 32% / 13%	23	32	32	11	2	56	Mixed
Tough Trucks	58% / 24% / 19%	17	41	24	10	8	59	Mixed
Other							3	Insufficient Data
9178. Did you participate in the Body Engineering Pilot of Pilot? (June-August 2002)								
Total	49% / 0% / 51%	49	0	0	0	51	328	Mixed
Family Vehicle Line	73% / 0% / 27%	73	0	0	0	27	45	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9169. Is technical depth/competence emphasized more today than it was at this time last year? — Lifestyle Vehicle Line	45% / 0% / 55%	45	0	0	0	55	60	Mixed
Lincoln	37% / 0% / 63%	37	0	0	0	63	52	Weakness
NAE	57% / 0% / 43%	57	0	0	0	43	7	Mixed
Outfitters	47% / 0% / 53%	47	0	0	0	53	76	Mixed
Tough Trucks	44% / 0% / 56%	44	0	0	0	56	77	Mixed
Other	50% / 0% / 50%	50	0	0	0	50	6	Mixed
Total	68% / 0% / 32%	68	0	0	0	32	324	Strength
Family Vehicle Line	80% / 0% / 20%	80	0	0	0	20	44	Strength
Lifestyle Vehicle Line	75% / 0% / 25%	75	0	0	0	25	59	Strength
Lincoln	60% / 0% / 40%	60	0	0	0	40	52	Mixed
NAE	71% / 0% / 29%	71	0	0	0	29	7	Strength
Outfitters	66% / 0% / 34%	66	0	0	0	34	76	Strength
Tough Trucks	67% / 0% / 33%	67	0	0	0	33	75	Strength
Other	50% / 0% / 50%	50	0	0	0	50	6	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9172. Do you feel that you are able to coach or help a team member in their technical development? Total	71% / 0% / 29%	71	0	0	0	29	327	Strength
Family Vehicle Line	64% / 0% / 36%	64	0	0	0	36	44	Strength
Lifestyle Vehicle Line	72% / 0% / 28%	72	0	0	0	28	60	Strength
Lincoln	79% / 0% / 21%	79	0	0	0	21	52	Strength
NAE	86% / 0% / 14%	86	0	0	0	14	7	Strength
Outfitters	70% / 0% / 30%	70	0	0	0	30	76	Strength
Tough Trucks	68% / 0% / 32%	68	0	0	0	32	78	Strength
Other	83% / 0% / 17%	83	0	0	0	17	6	Strength
9116. As a result of the ESP/TMM training, I have had a technical development discussion with my supervisor/manager. Total	53% / 0% / 47%	53	0	0	0	47	328	Mixed
Family Vehicle Line	73% / 0% / 27%	73	0	0	0	27	44	Strength
Lifestyle Vehicle Line	77% / 0% / 23%	77	0	0	0	23	60	Strength
Lincoln	23% / 0% / 77%	23	0	0	0	77	52	Weakness
NAE	86% / 0% / 14%	86	0	0	0	14	7	Strength
Outfitters	49% / 0% / 51%	49	0	0	0	51	76	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9117. This technical development discussion was better than previous ones. — Tough Trucks	46% / 0% / 54%	46	0	0	0	54	79	Mixed
Other	67% / 0% / 33%	67	0	0	0	33	6	Strength
Total	61% / 32% / 7%	13	48	32	6	1	168	Strength
Family Vehicle Line	60% / 33% / 7%	17	43	33	7	0	30	Strength
Lifestyle Vehicle Line	61% / 23% / 16%	14	48	23	11	5	44	Strength
Lincoln	50% / 42% / 8%	8	42	42	8	0	12	Mixed
NAE	50% / 50% / 0%	17	33	50	0	0	6	Mixed
Outfitters	64% / 33% / 3%	19	44	33	3	0	36	Strength
Tough Trucks	71% / 26% / 3%	6	65	26	3	0	34	Strength
Other							4	Insufficient Data
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager. — Total	73% / 16% / 11%	17	56	16	9	2	174	Strength
Family Vehicle Line	65% / 19% / 16%	16	48	19	16	0	31	Strength
Lifestyle Vehicle Line	72% / 15% / 13%	15	57	15	4	9	46	Strength
Lincoln	83% / 8% / 8%	17	67	8	8	0	12	Strength

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9106. Interactions with my peers.								
Lifestyle Vehicle Line	76% 0% 24%	76	0	0	0	24	46	Strength
Lincoln	70% 0% 30%	70	0	0	0	30	23	Strength
NAE	83% 0% 17%	83	0	0	0	17	6	Strength
Outfitters	71% 0% 29%	71	0	0	0	29	41	Strength
Tough Trucks	53% 0% 47%	53	0	0	0	47	45	Mixed
Other							4	Insufficient Data
Total	62% 0% 38%	62	0	0	0	38	202	Strength
Family Vehicle Line	68% 0% 32%	68	0	0	0	32	34	Strength
Lifestyle Vehicle Line	57% 0% 43%	57	0	0	0	43	47	Mixed
Lincoln	65% 0% 35%	65	0	0	0	35	23	Strength
NAE	83% 0% 17%	83	0	0	0	17	6	Strength
Outfitters	76% 0% 24%	76	0	0	0	24	41	Strength
Tough Trucks	48% 0% 52%	48	0	0	0	52	44	Mixed
Other							4	Insufficient Data

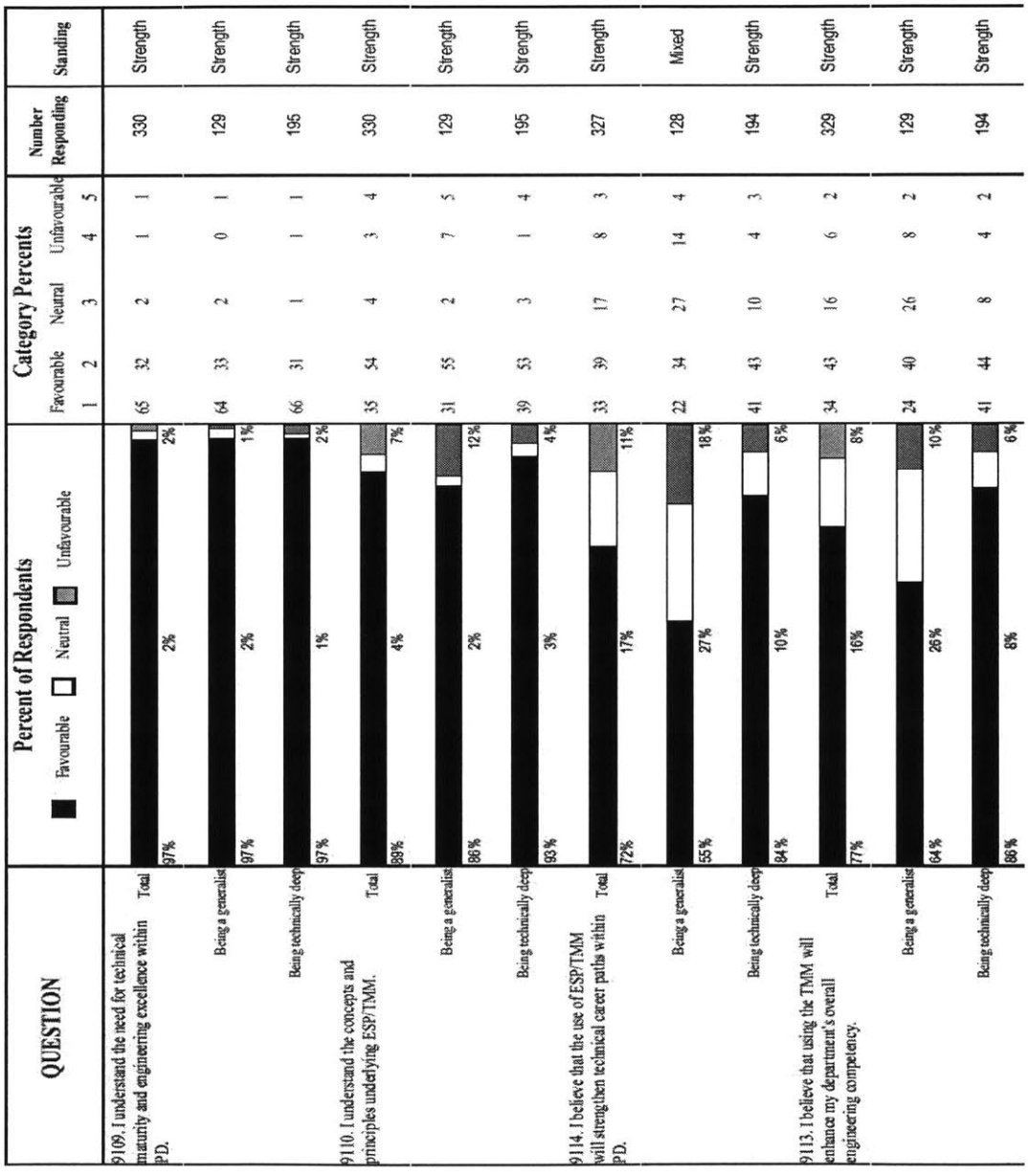
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9107. Through use of the TMM as a framework for determining appropriate technical development activities. — Total	75% / 0% / 25%	75	0	0	0	25	200	Strength
Family Vehicle Line	76% / 0% / 24%	76	0	0	0	24	34	Strength
Lifestyle Vehicle Line	66% / 0% / 34%	66	0	0	0	34	47	Strength
Lincoln	78% / 0% / 22%	78	0	0	0	22	23	Strength
NAE							4	Insufficient Data
Outfitters	88% / 0% / 13%	88	0	0	0	13	40	Strength
Tough Trucks	71% / 0% / 29%	71	0	0	0	29	45	Strength
Other							4	Insufficient Data
9103. Through use of Ford Design Institute (FDI) resources. — Total	36% / 0% / 64%	36	0	0	0	64	200	Weakness
Family Vehicle Line	24% / 0% / 76%	24	0	0	0	76	34	Weakness
Lifestyle Vehicle Line	28% / 0% / 72%	28	0	0	0	72	47	Weakness
Lincoln	68% / 0% / 32%	68	0	0	0	32	22	Strength
NAE	50% / 0% / 50%	50	0	0	0	50	6	Mixed
Outfitters	40% / 0% / 60%	40	0	0	0	60	40	Weakness

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM. — Tough Trucks	34% / 0% / 66%	34	0	0	0	66	44	Weakness
Other							4	Insufficient Data
Total	22% / 0% / 78%	22	0	0	0	78	199	Weakness
Family Vehicle Line	18% / 0% / 82%	18	0	0	0	82	34	Weakness
Lifestyle Vehicle Line	13% / 0% / 87%	13	0	0	0	87	47	Weakness
Lincoln	36% / 0% / 64%	36	0	0	0	64	22	Weakness
NAE	33% / 0% / 67%	33	0	0	0	67	6	Weakness
Outfitters	18% / 0% / 82%	18	0	0	0	82	39	Weakness
9123. Through use of the FLN self-inventory data and resulting learning solutions. — Tough Trucks	30% / 0% / 70%	30	0	0	0	70	44	Weakness
Other							4	Insufficient Data
Total	23% / 0% / 77%	23	0	0	0	77	199	Weakness
Family Vehicle Line	18% / 0% / 82%	18	0	0	0	82	34	Weakness
Lifestyle Vehicle Line	17% / 0% / 83%	17	0	0	0	83	47	Weakness
Lincoln	35% / 0% / 65%	35	0	0	0	65	23	Weakness

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9171. Are you implementing your ITDP (Individual Technical Development Plan)? NAE	33% / 0% / 67%	33	0	0	0	67	6	Weakness
Outfitters	31% / 0% / 69%	31	0	0	0	69	39	Weakness
Tough Trucks	23% / 0% / 77%	23	0	0	0	77	43	Weakness
Other							4	Insufficient Data
Total	84% / 0% / 16%	84	0	0	0	16	204	Strength
Family Vehicle Line	82% / 0% / 18%	82	0	0	0	18	34	Strength
Lifestyle Vehicle Line	87% / 0% / 13%	87	0	0	0	13	47	Strength
Lincoln	83% / 0% / 17%	83	0	0	0	17	23	Strength
NAE	83% / 0% / 17%	83	0	0	0	17	6	Strength
Outfitters	83% / 0% / 17%	83	0	0	0	17	41	Strength
Tough Trucks	84% / 0% / 16%	84	0	0	0	16	45	Strength
Other							4	Insufficient Data
9176. Do you understand the linkage between your Tech Club and the TMM? Total	61% / 0% / 39%	61	0	0	0	39	54	Strength
Family Vehicle Line	75% / 0% / 25%	75	0	0	0	25	8	Strength

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
Lifestyle Vehicle Line	 44% 0% 56%	44	0	0	0	56	9	Mixed
Lincoln	 56% 0% 44%	56	0	0	0	44	9	Mixed
NAE							1	Insufficient Data
Outfitters	 83% 0% 17%	83	0	0	0	17	12	Strength
Tough Trucks	 46% 0% 54%	46	0	0	0	54	13	Mixed

NOVEMBER 2002 RESPONSES BY "BELIEVE IS IMPORTANT"



QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents 1	2	3	4	5	Number Responding	Standing
9173. I believe the ESP/TMM project will strengthen my team's ability to meet business needs. Total	71% / 18% / 12%	29	42	18	9	3	329	Strength
Being a generalist	56% / 28% / 16%	18	38	28	12	4	129	Mixed
Being technically deep	81% / 10% / 8%	37	45	10	6	3	194	Strength
9111. I know how to use the TMM as a framework for facilitating technical development. Total	62% / 22% / 17%	17	45	22	12	5	327	Strength
Being a generalist	53% / 25% / 22%	11	43	25	15	7	129	Mixed
Being technically deep	68% / 19% / 13%	21	47	19	10	3	193	Strength
9112. I believe that using the TMM will enhance my technical depth within my functional area. Total	68% / 19% / 13%	24	44	19	11	2	329	Strength
Being a generalist	57% / 27% / 16%	12	44	27	15	2	129	Mixed
Being technically deep	77% / 12% / 11%	32	45	12	8	3	194	Strength
9170. I believe that technical depth was adequately considered in recent reorganization decisions. Total	37% / 30% / 33%	10	27	30	21	12	325	Weakness
Being a generalist	24% / 35% / 41%	5	20	35	21	20	128	Weakness
Being technically deep	45% / 26% / 29%	14	32	26	22	7	192	Mixed
9115. I believe that the ESP/TMM training was useful. Total	55% / 29% / 16%	12	43	29	10	6	326	Mixed
Being a generalist	42% / 38% / 20%	5	37	38	12	8	129	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
	Being technically deep	18	48	21	8	5	191	Strength
	65% 21% 13%							
9182. I believe that a functionally-based PDC5 will enhance my technical development.	Total	13	38	36	9	4	236	Mixed
	51% 36% 14%							
	Being a generalist	7	31	43	15	4	96	Weakness
	39% 43% 19%							
	Being technically deep	18	44	29	5	4	135	Strength
	61% 29% 10%							
9178. Did you participate in the Body Engineering Pilot of Pilot? (June-August 2002)	Total	49	0	0	0	51	328	Mixed
	49% 0% 51%							
	Being a generalist	49	0	0	0	51	129	Mixed
	49% 0% 51%							
	Being technically deep	49	0	0	0	51	194	Mixed
	49% 0% 51%							
9169. Is technical depth/competence emphasized more today than it was at this time last year?	Total	68	0	0	0	32	324	Strength
	68% 0% 32%							
	Being a generalist	56	0	0	0	44	128	Mixed
	56% 0% 44%							
	Being technically deep	77	0	0	0	23	191	Strength
	77% 0% 23%							
9172. Do you feel that you are able to coach or help a team member in their technical development?	Total	71	0	0	0	29	327	Strength
	71% 0% 29%							
	Being a generalist	61	0	0	0	39	128	Strength
	61% 0% 39%							
	Being technically deep	77	0	0	0	23	194	Strength
	77% 0% 23%							

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9116. As a result of the ESP/TMM training, I have had a technical development discussion with my supervisor/manager. Total	53% / 0% / 47%	53	0	0	0	47	328	Mixed
Being a generalist	48% / 0% / 52%	48	0	0	0	52	129	Mixed
Being technically deep	58% / 0% / 42%	58	0	0	0	42	194	Mixed
9117. This technical development discussion was better than previous ones. Total	51% / 32% / 7%	13	48	32	6	1	168	Strength
Being a generalist	53% / 40% / 7%	7	47	40	3	3	60	Mixed
Being technically deep	65% / 27% / 7%	17	49	27	7	0	107	Strength
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager. Total	73% / 16% / 11%	17	56	16	9	2	174	Strength
Being a generalist	68% / 21% / 11%	13	55	21	8	3	62	Strength
Being technically deep	76% / 14% / 11%	20	56	14	9	2	111	Strength
9100. As a result of the ESP/TMM training, I have created a technical development plan. Total	63% / 0% / 37%	63	0	0	0	37	328	Strength
Being a generalist	62% / 0% / 38%	62	0	0	0	38	128	Strength
Being technically deep	64% / 0% / 36%	64	0	0	0	36	194	Strength
9105. A discussion with my supervisor/manager. Total	68% / 0% / 32%	68	0	0	0	32	203	Strength
Being a generalist	62% / 0% / 38%	62	0	0	0	38	78	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9106. Interactions with my peers. — Being technically deep	72% / 0% / 28%	72	0	0	0	28	125	Strength
9106. Interactions with my peers. — Total	62% / 0% / 38%	62	0	0	0	38	202	Strength
9107. Through use of the TMM as a framework for determining appropriate technical development activities. — Being a generalist	56% / 0% / 44%	56	0	0	0	44	79	Mixed
9107. Through use of the TMM as a framework for determining appropriate technical development activities. — Being technically deep	67% / 0% / 33%	67	0	0	0	33	123	Strength
9107. Through use of the TMM as a framework for determining appropriate technical development activities. — Total	75% / 0% / 25%	75	0	0	0	25	200	Strength
9103. Through use of Ford Design Institute (FDI) resources. — Being a generalist	67% / 0% / 33%	67	0	0	0	33	79	Strength
9103. Through use of Ford Design Institute (FDI) resources. — Being technically deep	80% / 0% / 20%	80	0	0	0	20	121	Strength
9103. Through use of Ford Design Institute (FDI) resources. — Total	36% / 0% / 64%	36	0	0	0	64	200	Weakness
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM. — Being a generalist	22% / 0% / 78%	22	0	0	0	78	77	Weakness
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM. — Being technically deep	45% / 0% / 55%	45	0	0	0	55	123	Mixed
9104. Through use of Ford Learning Network (FLN) as an interface to the TMM. — Total	22% / 0% / 78%	22	0	0	0	78	199	Weakness
Being a generalist	13% / 0% / 87%	13	0	0	0	87	78	Weakness
Being technically deep	27% / 0% / 73%	27	0	0	0	73	121	Weakness

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9123. Through use of the FLN self-inventory data and resulting learning solutions. Total	23% / 0% / 77%	23	0	0	0	77	199	Weakness
Being a generalist	14% / 0% / 86%	14	0	0	0	86	78	Weakness
Being technically deep	29% / 0% / 71%	29	0	0	0	71	121	Weakness
9171. Are you implementing your ITDP (Individual Technical Development Plan)? Total	84% / 0% / 16%	84	0	0	0	16	204	Strength
Being a generalist	82% / 0% / 18%	82	0	0	0	18	78	Strength
Being technically deep	85% / 0% / 15%	85	0	0	0	15	124	Strength
9176. Do you understand the linkage between your Tech Club and the TMM? Total	61% / 0% / 39%	61	0	0	0	39	54	Strength
Being a generalist	52% / 0% / 48%	52	0	0	0	48	21	Mixed
Being technically deep	66% / 0% / 34%	66	0	0	0	34	32	Strength

Appendix I

SURVEY QUESTIONS FROM AUGUST 2003

ID	Question	Type
2949	How many years have you worked at Ford?	Multiple Choice
8487	What is your Salary Grade/Leadership Level?	Multiple Choice
9174	What are you told is more important (generalist/technically deep)?	Multiple Choice
9175	What do you believe is more valued by the organization (generalist/technically deep)?	Multiple Choice
9179	Are you currently an FCG?	Yes/No
9187	In which organization do you work?	Multiple Choice
9592	With which functional area are you most closely associated?	Multiple Choice
9594	Did you access the FLn system for your ITDP?	Yes/No
9595	Have you received ESP/TMM training?	Yes/No
9596	Do you know your PDC5 representative?	Yes/No
9597	Have you met with your PDC5 rep to discuss your development?	Yes/No
9601	Of those communications you receive, please select the 2 that you find most valuable for getting news about what's going on in ESP/TMM.	Multiple Choice
9602	How often do you prefer to receive ESP communications?	Multiple Choice
9603	Have you visited the ESP website?	Yes/No
9100	As a result of the ESP/TMM training, I have created a technical development plan.	Yes/No
9103	My technical development plan was enhanced: Through use of Ford Design Institute (FDI) resources.	Yes/No
9104	My technical development plan was enhanced: Through use of the Ford Learning Network (FLN) as an interface to the TMM.	Yes/No
9105	My technical development plan was enhanced: A discussion with my supervisor/manager.	Yes/No
9106	My technical development plan was enhanced: Interaction with my peers.	Yes/No

9107	My technical development plan was enhanced: Through use of the TMM as a framework for determining appropriate technical development activities.	Yes/No
9109	I understand the need for technical maturity and engineering excellence within PD.	1-5 Range
9110	I understand the concepts and principles underlying ESP/TMM.	1-5 Range
9111	I know how to use the TMM as a framework for facilitating technical development.	1-5 Range
9112	I believe that using the TMM will enhance my technical depth with my functional area.	1-5 Range
9114	I believe that the use of ESP/TMM will strengthen technical career paths within PD.	1-5 Range
9117	This technical development discussion was better than previous ones.	1-5 Range
9118	Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager	1-5 Range
9123	My technical development plan was enhanced: Through use of the FLM self-inventory data and resulting learning solutions.	Yes/No
9169	Is technical depth/competence emphasized more today than it was at this time last year?	Yes/No
9171	Are you implementing your ITDP (Individual Technical Development Plan)?	Yes/No
9172	Do you feel that you are able to coach or help a team member in their technical development?	Yes/No
9173	I believe the ESP/TMM project will strengthen my team's ability to meet business needs.	1-5 Range
9182	I believe that a functionally-based PDC5 will enhance my technical development.	1-5 Range
9590	During 2003, I have had a technical development discussion with my supervisor/manager.	Yes/No
9591	During the technical development discussion, the ITDP was used as a tool to guide my technical development.	Yes/No
9598	The new Senior Engineer classification (SG 08) is a step in the right directi0n toward creating more opportunities for a technical career path in PD.	1-5 Range
9599	The new Technical Specialist positions (which are implementation focused) are creating more	1-5 Range

	opportunities for technical career paths in PD.	
9600	I am satisfied with the training resources that are available to meet my technical needs	1-5 Range
9604	How useful is the ESP website for supporting your understanding of technical development within PD and related activities?	1-5 Range
9605	As a result of PD's focus on ESP/TMM, I am interested in continuing on a technical career path.	1-5 Range

Appendix J

DEMOGRAPHIC RESULTS FROM AUGUST 2003 SURVEY

QUESTION	Number Responding	Pct of Total
2949. How many years have you worked at Ford?		
0 - 5 years	136	28
6 - 10 years	123	26
11 - 15 years	111	23
16 - 20 years	28	6
21 - 25 years	31	6
26 - 30 years	31	6
More than 30 years	22	5
8487. What is your Salary Grade / Leadership Level?		
General Salary Roll (SG 1 - 8)	341	70
LL 6 (MR - Salary Grade 9 - 10)	129	27
LL 5 and above (Salary Grade 11 and above)	15	3
9174. What are you told is more important?		
Being a generalist	48	10
Being technically deep	423	90
9175. What do you believe is more valued by the organization?		
Being a generalist	169	36
Being technically deep	296	64
9179. Are you currently an FCG?		
Yes	5	1
No	478	99
9180. When were you hired at Ford?		
2001	2	50

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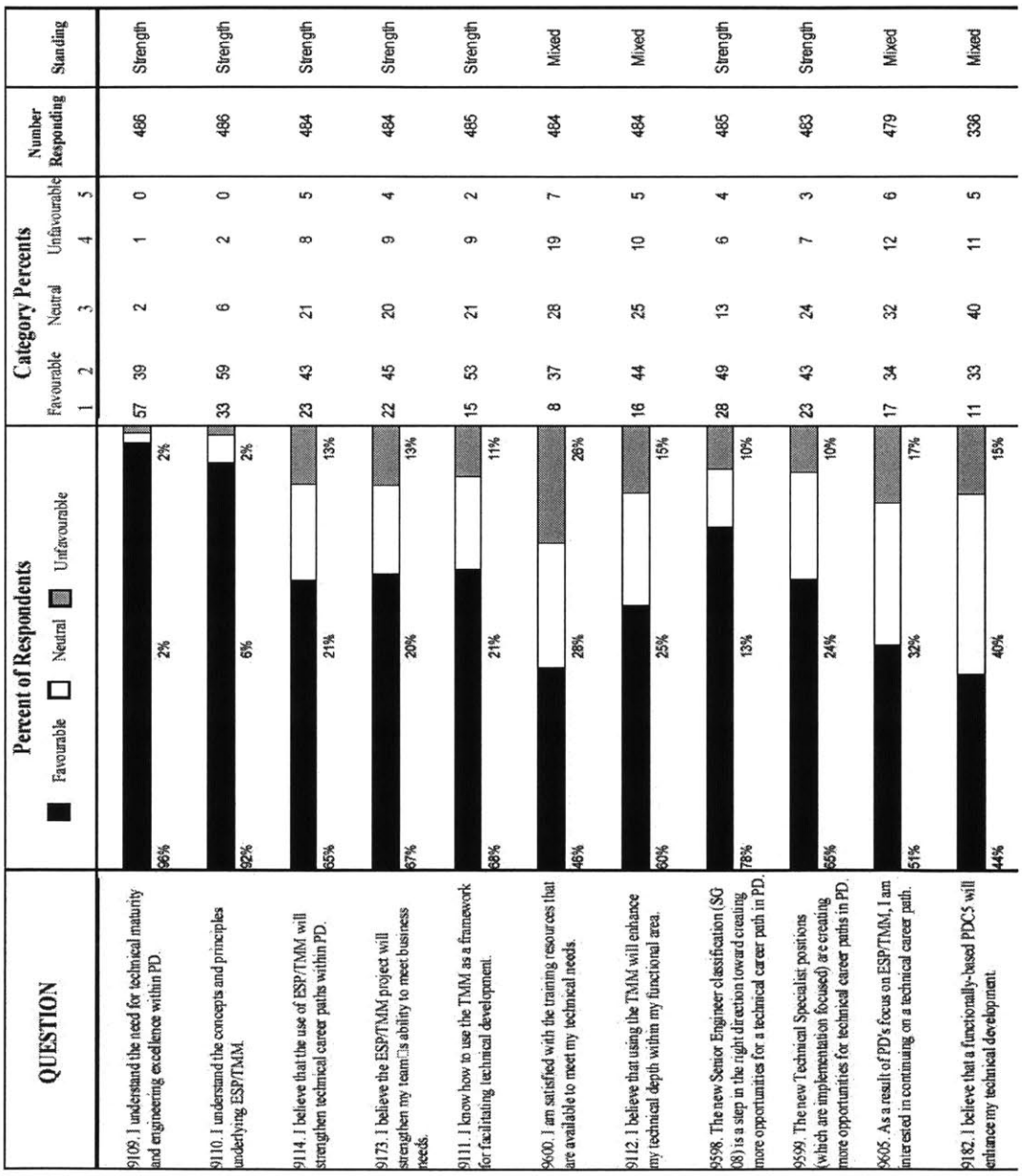
QUESTION	Number Responding	Pct of Total
2002	2	50
9187. In which organization do you work?		
NAE	191	41
SUV & BOF	102	22
PT & C	43	9
Small FWD & RWD	65	14
Medium & Large FWD & AWD	64	14
9592. With which functional area are you most closely associated?		
Body	310	64
Chassis	155	32
Other	19	4
9594. Did you access the FLn system for your ITDP?		
Yes	153	32
No	324	68
9595. Have you received ESP/TMM training?		
ESP/TMM training	487	100
9596. Do you know your PDC5 representative?		
Yes	203	60
No	138	40
9597. Have you met with your PDC5 rep to discuss your development?		
Yes	54	27
No	149	73
9601. Of those communications you receive, please select the 2 that you find most valuable for getting news about what's going on in ESP/TMM.		
Cascade meetings with my management (e.g., All Hands)	292	33

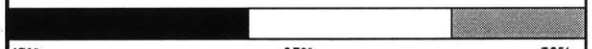
QUESTION	Number Responding	Pct of Total
Local PD Communications (e.g., ESP Proof Points e-mail newsletters, e-mails from local PD Leadership, etc.)	163	18
Staff Meetings with PD supervisor	254	29
ESP website	54	6
Conversations with colleagues	120	14
9602. How often do you prefer to receive ESP communications?		
Daily	1	0
Weekly	48	11
Monthly	212	48
Quarterly	121	27
Twice a year	32	7
Annually	32	7
9603. Have you visited the ESP website?		
Yes	201	42
No	281	58

Appendix K

TOTAL RESULTS FROM AUGUST 2003 SURVEY

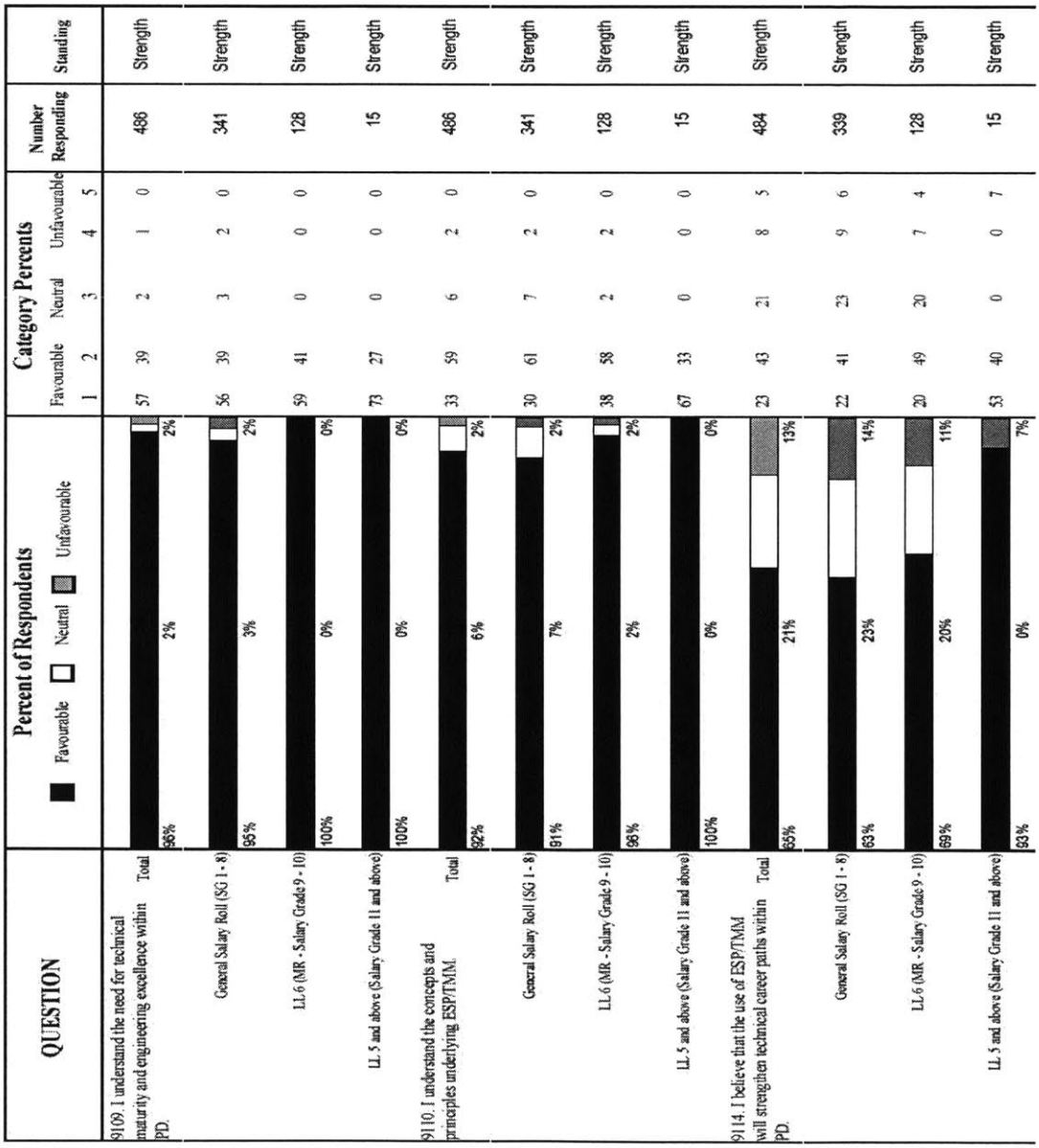


QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9169. Is technical depth/competence emphasized more today than it was at this time last year?	73% / 0% / 27%	73	0	0	0	27	483	Strength
9172. Do you feel that you are able to coach or help a team member in their technical development?	78% / 0% / 22%	78	0	0	0	22	483	Strength
9590. During 2003, I have had a technical development discussion with my supervisor/manager.	69% / 0% / 31%	69	0	0	0	31	482	Strength
9591. During the technical development discussion, the ITDP was used as a tool to guide my technical development.	65% / 0% / 35%	65	0	0	0	35	323	Strength
9117. This technical development discussion was better than previous ones.	58% / 35% / 7%	8	50	35	6	2	326	Mixed
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager.	69% / 25% / 7%	14	54	25	4	2	329	Strength
9100. As a result of the ESP/TMM training, I have created a technical development plan.	65% / 0% / 35%	65	0	0	0	35	480	Strength
9105. My technical development plan was enhanced by: A discussion with my supervisor/manager.	75% / 0% / 25%	75	0	0	0	25	308	Strength
9106. My technical development plan was enhanced by: Interactions with my peers.	54% / 0% / 46%	54	0	0	0	46	306	Mixed
9107. My technical development plan was enhanced: Through use of the TMM as a framework for determining appropriate technical	72% / 0% / 28%	72	0	0	0	28	309	Strength
9103. My technical development plan was enhanced: Through use of Ford Design Institute (FDI) resources.	45% / 0% / 55%	45	0	0	0	55	305	Mixed
9104. My technical development plan was enhanced: Through use of Ford Learning Network (FLn) as an interface to the TMM.	28% / 0% / 72%	28	0	0	0	72	307	Weakness

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9123. My technical development plan was enhanced: Through use of the FLn self-inventory data and resulting learning solutions.	 25% 0% 75%	25	0	0	0	75	301	Weakness
9171. Are you implementing your ITDP (Individual Technical Development Plan)?	 79% 0% 21%	79	0	0	0	21	305	Strength
9604. How useful is the ESP website for supporting your understanding of technical development within PD and related activities?	 42% 35% 23%	5	37	35	18	6	197	Mixed

Appendix K

AUGUST 2003 RESPONSES BY SALARY GRADE/LEADERSHIP LEVEL



QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9173. I believe the ESP/TMM project will strengthen my team□s ability to meet business needs. — Total	67% / 20% / 13%	22	45	20	9	4	484	Strength
General Salary Roll (SG 1 - 8)	63% / 22% / 15%	22	41	22	10	5	339	Strength
LL 6 (MR - Salary Grade 9 - 10)	74% / 16% / 10%	19	55	16	9	2	128	Strength
LL 5 and above (Salary Grade 11 and above)	93% / 0% / 7%	53	40	0	0	7	15	Strength
9111. I know how to use the TMM as a framework for facilitating technical development. — Total	68% / 21% / 11%	15	53	21	9	2	485	Strength
General Salary Roll (SG 1 - 8)	63% / 23% / 14%	14	49	23	12	2	340	Strength
LL 6 (MR - Salary Grade 9 - 10)	80% / 15% / 5%	13	66	15	5	1	128	Strength
LL 5 and above (Salary Grade 11 and above)	80% / 20% / 0%	40	40	20	0	0	15	Strength
9600. I am satisfied with the training resources that are available to meet my technical needs. — Total	46% / 28% / 26%	8	37	28	19	7	484	Mixed
General Salary Roll (SG 1 - 8)	45% / 28% / 27%	8	36	28	19	8	339	Mixed
LL 6 (MR - Salary Grade 9 - 10)	48% / 27% / 25%	9	40	27	19	6	128	Mixed
LL 5 and above (Salary Grade 11 and above)	60% / 33% / 7%	13	47	33	7	0	15	Strength
9112. I believe that using the TMM will enhance my technical depth within my functional area. — Total	60% / 25% / 15%	16	44	25	10	5	484	Mixed
General Salary Roll (SG 1 - 8)	56% / 27% / 17%	16	40	27	11	6	339	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9598. The new Senior Engineer classification (SG 08) is a step in the right direction toward creating more opportunities for a technical career path in PD.								
LL 6 (MR - Salary Grade 9 - 10)	66% / 23% / 10%	14	52	23	7	3	128	Strength
LL 5 and above (Salary Grade 11 and above)	93% / 0% / 7%	33	60	0	7	0	15	Strength
Total	78% / 13% / 10%	28	49	13	6	4	485	Strength
General Salary Roll (SG 1 - 8)	76% / 14% / 10%	27	49	14	6	4	341	Strength
LL 6 (MR - Salary Grade 9 - 10)	81% / 10% / 9%	28	53	10	6	3	127	Strength
LL 5 and above (Salary Grade 11 and above)	93% / 0% / 7%	60	33	0	0	7	15	Strength
9599. The new Technical Specialist positions (which are implementation focused) are creating more opportunities for technical career paths in PD.								
Total	65% / 24% / 10%	23	43	24	7	3	483	Strength
General Salary Roll (SG 1 - 8)	64% / 25% / 11%	22	42	25	8	3	338	Strength
LL 6 (MR - Salary Grade 9 - 10)	68% / 22% / 10%	20	48	22	7	3	128	Strength
LL 5 and above (Salary Grade 11 and above)	80% / 20% / 0%	53	27	20	0	0	15	Strength
9605. As a result of PD's focus on ESP/TMM, I am interested in continuing on a technical career path.								
Total	51% / 32% / 17%	17	34	32	12	6	479	Mixed
General Salary Roll (SG 1 - 8)	53% / 29% / 18%	18	36	29	12	6	337	Mixed
LL 6 (MR - Salary Grade 9 - 10)	43% / 39% / 18%	13	30	39	13	6	126	Mixed
LL 5 and above (Salary Grade 11 and above)	64% / 36% / 0%	29	36	36	0	0	14	Strength

QUESTION	Percent of Respondents (■ Favourable □ Neutral ▨ Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9182. I believe that a functionally-based PDC5 will enhance my technical development. Total	44% / 40% / 15%	11	33	40	11	5	336	Mixed
General Salary Roll (SG 1 - 8)	44% / 40% / 15%	11	33	40	11	5	336	Mixed
9169. Is technical depth/competence emphasized more today than it was at this time last year? Total	73% / 0% / 27%	73	0	0	0	27	483	Strength
General Salary Roll (SG 1 - 8)	72% / 0% / 28%	72	0	0	0	28	338	Strength
LL 6 (MR - Salary Grade 9 - 10)	77% / 0% / 23%	77	0	0	0	23	128	Strength
LL 5 and above (Salary Grade 11 and above)	80% / 0% / 20%	80	0	0	0	20	15	Strength
9172. Do you feel that you are able to coach or help a team member in their technical development? Total	78% / 0% / 22%	78	0	0	0	22	483	Strength
General Salary Roll (SG 1 - 8)	74% / 0% / 26%	74	0	0	0	26	338	Strength
LL 6 (MR - Salary Grade 9 - 10)	88% / 0% / 12%	88	0	0	0	12	128	Strength
LL 5 and above (Salary Grade 11 and above)	87% / 0% / 13%	87	0	0	0	13	15	Strength
9590. During 2003, I have had a technical development discussion with my supervisor/manager. Total	69% / 0% / 31%	69	0	0	0	31	482	Strength
General Salary Roll (SG 1 - 8)	72% / 0% / 28%	72	0	0	0	28	339	Strength
LL 6 (MR - Salary Grade 9 - 10)	61% / 0% / 39%	61	0	0	0	39	126	Strength
LL 5 and above (Salary Grade 11 and above)	53% / 0% / 47%	53	0	0	0	47	15	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9591. During the technical development discussion, the ITDP was used as a tool to guide my technical development. Total	65% / 0% / 35%	65	0	0	0	35	323	Strength
General Salary Roll (SG 1 - 8)	65% / 0% / 35%	65	0	0	0	35	240	Strength
LL 6 (MR - Salary Grade 9 - 10)	69% / 0% / 31%	69	0	0	0	31	75	Strength
LL 5 and above (Salary Grade 11 and above)	29% / 0% / 71%	29	0	0	0	71	7	Weakness
9117. This technical development discussion was better than previous ones. Total	58% / 35% / 7%	8	50	35	6	2	326	Mixed
General Salary Roll (SG 1 - 8)	59% / 33% / 8%	8	51	33	6	2	240	Mixed
LL 6 (MR - Salary Grade 9 - 10)	55% / 41% / 4%	7	49	41	3	1	76	Mixed
LL 5 and above (Salary Grade 11 and above)	63% / 38% / 0%	13	50	38	0	0	8	Strength
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager. Total	69% / 25% / 7%	14	54	25	4	2	329	Strength
General Salary Roll (SG 1 - 8)	68% / 25% / 7%	16	52	25	4	3	242	Strength
LL 6 (MR - Salary Grade 9 - 10)	71% / 22% / 6%	10	61	22	5	1	77	Strength
LL 5 and above (Salary Grade 11 and above)	75% / 25% / 0%	13	63	25	0	0	8	Strength
9100. As a result of the ESP/TMM training, I have created a technical development plan. Total	65% / 0% / 35%	65	0	0	0	35	480	Strength
General Salary Roll (SG 1 - 8)	65% / 0% / 35%	65	0	0	0	35	337	Strength

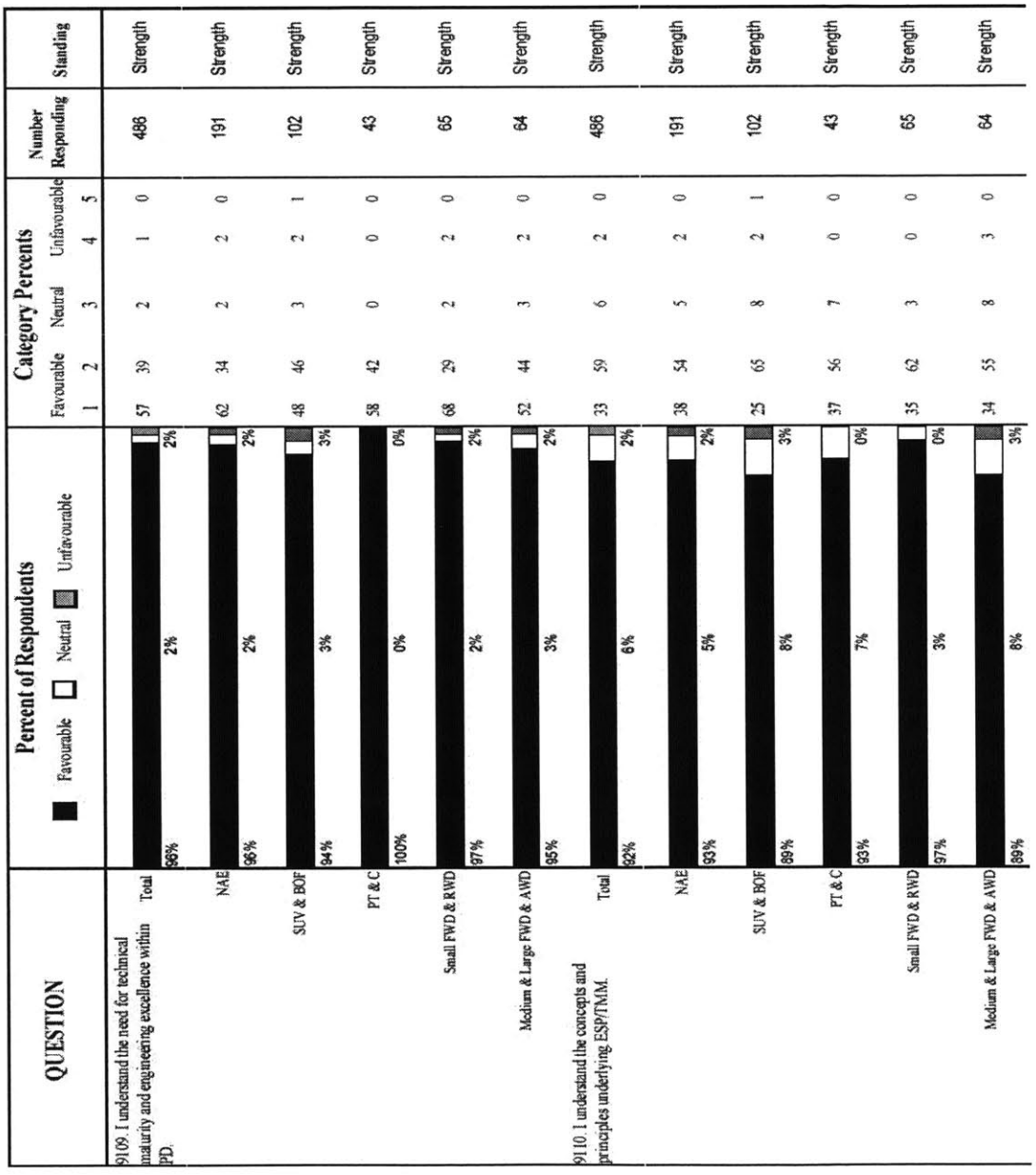
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
LL 6 (MR - Salary Grade 9 - 10)	65% / 0% / 35%	65	0	0	0	35	126	Strength
LL 5 and above (Salary Grade 11 and above)	40% / 0% / 60%	40	0	0	0	60	15	Weakness
9105. My technical development plan was enhanced by: A discussion with my supervisor/manager. Total	75% / 0% / 25%	75	0	0	0	25	308	Strength
General Salary Roll (SG 1 - 8)	80% / 0% / 20%	80	0	0	0	20	219	Strength
LL 6 (MR - Salary Grade 9 - 10)	62% / 0% / 38%	62	0	0	0	38	81	Strength
LL 5 and above (Salary Grade 11 and above)	67% / 0% / 33%	67	0	0	0	33	6	Strength
9106. My technical development plan was enhanced by: Interactions with my peers. Total	54% / 0% / 46%	54	0	0	0	46	306	Mixed
General Salary Roll (SG 1 - 8)	55% / 0% / 45%	55	0	0	0	45	218	Mixed
LL 6 (MR - Salary Grade 9 - 10)	48% / 0% / 53%	48	0	0	0	53	80	Mixed
LL 5 and above (Salary Grade 11 and above)	100% / 0% / 0%	100	0	0	0	0	6	Strength
9107. My technical development plan was enhanced: Through use of the TMM as a framework for determining appropriate technical development activities. Total	72% / 0% / 28%	72	0	0	0	28	309	Strength
General Salary Roll (SG 1 - 8)	74% / 0% / 26%	74	0	0	0	26	219	Strength
LL 6 (MR - Salary Grade 9 - 10)	65% / 0% / 35%	65	0	0	0	35	82	Strength
LL 5 and above (Salary Grade 11 and above)	100% / 0% / 0%	100	0	0	0	0	6	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9103. My technical development plan was enhanced: Through use of Ford Design Institute (FDI) resources. Total	45% / 0% / 55%	45	0	0	0	55	305	Mixed
General Salary Roll (SG 1 - 8)	48% / 0% / 52%	48	0	0	0	52	216	Mixed
LL 6 (MR - Salary Grade 9 - 10)	37% / 0% / 63%	37	0	0	0	63	81	Weakness
LL 5 and above (Salary Grade 11 and above)	33% / 0% / 67%	33	0	0	0	67	6	Weakness
9104. My technical development plan was enhanced: Through use of Ford Learning Network (FLn) as an interface to the TMM. Total	28% / 0% / 72%	28	0	0	0	72	307	Weakness
General Salary Roll (SG 1 - 8)	30% / 0% / 70%	30	0	0	0	70	218	Weakness
LL 6 (MR - Salary Grade 9 - 10)	22% / 0% / 78%	22	0	0	0	78	81	Weakness
LL 5 and above (Salary Grade 11 and above)	50% / 0% / 50%	50	0	0	0	50	6	Mixed
9123. My technical development plan was enhanced: Through use of the FLn self-inventory data and resulting learning solutions. Total	25% / 0% / 75%	25	0	0	0	75	301	Weakness
General Salary Roll (SG 1 - 8)	26% / 0% / 74%	26	0	0	0	74	215	Weakness
LL 6 (MR - Salary Grade 9 - 10)	22% / 0% / 78%	22	0	0	0	78	78	Weakness
LL 5 and above (Salary Grade 11 and above)	33% / 0% / 67%	33	0	0	0	67	6	Weakness
9171. Are you implementing your ITDP (Individual Technical Development Plan)? Total	79% / 0% / 21%	79	0	0	0	21	305	Strength
General Salary Roll (SG 1 - 8)	80% / 0% / 20%	80	0	0	0	20	216	Strength

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable Neutral Unfavourable 1 2 3 4 5	Number Responding	Standing
9604. How useful is the ESP website for supporting your understanding of technical development within PD and related activities?	LL 6 (MR - Salary Grade 9 - 10) 77% 0% 23%	77 0 0 0 23	82	Strength
	LL 5 and above (Salary Grade 11 and above) 80% 0% 20%	80 0 0 0 20	5	Strength
	Total 42% 35% 23%	5 37 35 18 6	197	Mixed
	General Salary Roll (SG 1 - 8) 43% 36% 21%	3 40 36 17 3	121	Mixed
	LL 6 (MR - Salary Grade 9 - 10) 40% 33% 27%	7 33 33 19 7	67	Mixed
	LL 5 and above (Salary Grade 11 and above) 38% 38% 25%	0 38 38 13 13	8	Weakness

Appendix L

AUGUST 2003 RESPONSES BY ORGANIZATION



QUESTION	Percent of Respondents (■ Favourable □ Neutral ▒ Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9114. I believe that the use of ESP/TMM will strengthen technical career paths within PD. Total	65% 21% 13%	23	43	21	8	5	484	Strength
NAE	66% 20% 14%	28	38	20	8	6	191	Strength
SUV & BOF	64% 24% 12%	17	48	24	8	4	101	Strength
PT & C	67% 30% 2%	21	47	30	0	2	43	Strength
Small FWD & RWD	69% 15% 15%	23	46	15	8	8	65	Strength
Medium & Large FWD & AWD	63% 19% 19%	22	41	19	14	5	64	Strength
9173. I believe the ESP/TMM project will strengthen my team□s ability to meet business needs. Total	67% 20% 13%	22	45	20	9	4	484	Strength
NAE	66% 18% 16%	24	42	18	11	5	190	Strength
SUV & BOF	66% 20% 14%	18	49	20	10	4	101	Strength
PT & C	63% 37% 0%	26	37	37	0	0	43	Strength
Small FWD & RWD	74% 15% 11%	26	48	15	6	5	65	Strength
Medium & Large FWD & AWD	67% 17% 16%	20	47	17	11	5	64	Strength
9111. I know how to use the TMM as a framework for facilitating technical development. Total	68% 21% 11%	15	53	21	9	2	485	Strength
NAE	66% 23% 11%	19	48	23	9	2	191	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9600. I am satisfied with the training resources that are available to meet my technical needs.								
SUV & BOF	71% / 19% / 10%	15	56	19	9	1	101	Strength
PT & C	65% / 30% / 5%	16	49	30	5	0	43	Strength
Small FWD & RWD	69% / 17% / 14%	12	57	17	11	3	65	Strength
Medium & Large FWD & AWD	69% / 16% / 16%	6	63	16	13	3	64	Strength
Total	46% / 28% / 26%	8	37	28	19	7	484	Mixed
NAE	44% / 29% / 27%	11	33	29	19	8	190	Mixed
SUV & BOF	52% / 24% / 24%	10	43	24	20	4	101	Mixed
PT & C	47% / 35% / 19%	14	33	35	14	5	43	Mixed
Small FWD & RWD	42% / 29% / 29%	2	40	29	22	8	65	Mixed
Medium & Large FWD & AWD	44% / 25% / 31%	3	41	25	17	14	64	Mixed
9112. I believe that using the TMM will enhance my technical depth within my functional area.								
Total	60% / 25% / 15%	16	44	25	10	5	484	Mixed
NAE	57% / 28% / 15%	20	37	28	10	5	189	Mixed
SUV & BOF	68% / 18% / 15%	13	55	18	11	4	102	Strength
PT & C	58% / 37% / 5%	14	44	37	5	0	43	Mixed

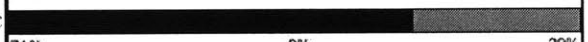
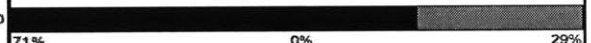
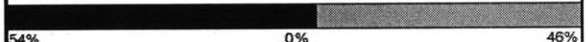
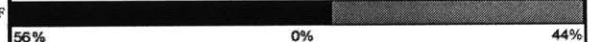
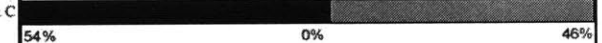
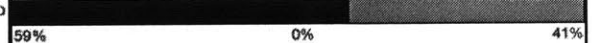
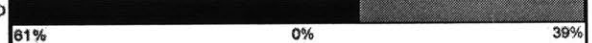
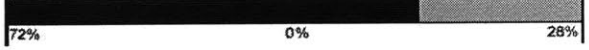
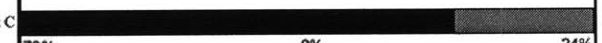
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9598. The new Senior Engineer classification (SG 08) is a step in the right direction toward creating more opportunities for a technical career path in PD.								
Small FWD & RWD	63% / 22% / 15%	14	49	22	11	5	65	Strength
Medium & Large FWD & AWD	53% / 25% / 22%	16	38	25	14	8	64	Mixed
Total	78% / 13% / 10%	28	49	13	6	4	485	Strength
NAE	75% / 15% / 10%	31	44	15	6	4	191	Strength
SUV & BOF	80% / 10% / 10%	29	51	10	6	4	101	Strength
PT & C	81% / 14% / 5%	30	51	14	5	0	43	Strength
Small FWD & RWD	82% / 12% / 6%	28	54	12	3	3	65	Strength
Medium & Large FWD & AWD	78% / 13% / 9%	25	53	13	6	3	64	Strength
9599. The new Technical Specialist positions (which are implementation focused) are creating more opportunities for technical career paths in PD.								
Total	65% / 24% / 10%	23	43	24	7	3	483	Strength
NAE	65% / 25% / 10%	28	37	25	6	4	191	Strength
SUV & BOF	64% / 23% / 13%	22	43	23	10	3	101	Strength
PT & C	65% / 33% / 2%	16	49	33	2	0	43	Strength
Small FWD & RWD	73% / 20% / 6%	17	56	20	5	2	64	Strength
Medium & Large FWD & AWD	60% / 24% / 16%	21	40	24	10	6	63	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9605. As a result of PD's focus on ESP/TMM, I am interested in continuing on a technical career path. — Total	51% / 32% / 17%	17	34	32	12	6	479	Mixed
NAE	56% / 25% / 20%	22	33	25	11	9	187	Mixed
SUV & BOF	48% / 35% / 18%	12	36	35	14	4	101	Mixed
PT & C	57% / 36% / 7%	17	40	36	7	0	42	Mixed
Small FWD & RWD	48% / 42% / 11%	14	34	42	8	3	65	Mixed
Medium & Large FWD & AWD	43% / 33% / 24%	14	29	33	19	5	63	Mixed
9182. I believe that a functionally-based PDC5 will enhance my technical development. — Total	44% / 40% / 15%	11	33	40	11	5	336	Mixed
NAE	46% / 35% / 19%	15	31	35	13	6	141	Mixed
SUV & BOF	45% / 42% / 13%	8	37	42	11	3	76	Mixed
PT & C	46% / 46% / 8%	8	38	46	8	0	26	Mixed
Small FWD & RWD	33% / 56% / 11%	4	29	56	4	7	45	Weakness
Medium & Large FWD & AWD	43% / 40% / 18%	10	33	40	13	5	40	Mixed
9169. Is technical depth/competence emphasized more today than it was at this time last year? — Total	73% / 0% / 27%	73	0	0	0	27	483	Strength
NAE	72% / 0% / 28%	72	0	0	0	28	189	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9172. Do you feel that you are able to coach or help a team member in their technical development? — SUV & BOF	75% / 0% / 25%	75	0	0	0	25	102	Strength
PT & C	69% / 0% / 31%	69	0	0	0	31	42	Strength
Small FWD & RWD	82% / 0% / 18%	82	0	0	0	18	65	Strength
Medium & Large FWD & AWD	64% / 0% / 36%	64	0	0	0	36	64	Strength
Total	78% / 0% / 22%	78	0	0	0	22	483	Strength
9590. During 2003, I have had a technical development discussion with my supervisor/manager. — NAE	78% / 0% / 22%	78	0	0	0	22	190	Strength
SUV & BOF	75% / 0% / 25%	75	0	0	0	25	101	Strength
PT & C	91% / 0% / 9%	91	0	0	0	9	43	Strength
Small FWD & RWD	72% / 0% / 28%	72	0	0	0	28	65	Strength
Medium & Large FWD & AWD	79% / 0% / 21%	79	0	0	0	21	63	Strength
Total	69% / 0% / 31%	69	0	0	0	31	482	Strength
NAE	72% / 0% / 28%	72	0	0	0	28	189	Strength
SUV & BOF	66% / 0% / 34%	66	0	0	0	34	101	Strength
PT & C	65% / 0% / 35%	65	0	0	0	35	43	Strength

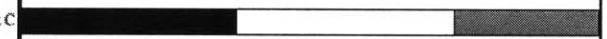
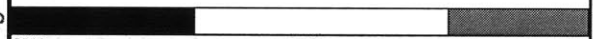
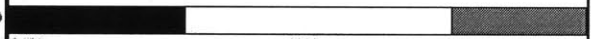
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9591. During the technical development discussion, the ITDP was used as a tool to guide my technical development. — Small FWD & RWD	69% / 0% / 31%	69	0	0	0	31	64	Strength
Medium & Large FWD & AWD	69% / 0% / 31%	69	0	0	0	31	64	Strength
Total	65% / 0% / 35%	65	0	0	0	35	323	Strength
NAE	65% / 0% / 35%	65	0	0	0	35	134	Strength
SUV & BOF	63% / 0% / 37%	63	0	0	0	37	67	Strength
PT & C	64% / 0% / 36%	64	0	0	0	36	28	Strength
Small FWD & RWD	74% / 0% / 26%	74	0	0	0	26	42	Strength
Medium & Large FWD & AWD	64% / 0% / 36%	64	0	0	0	36	42	Strength
9117. This technical development discussion was better than previous ones. — Total	58% / 35% / 7%	8	50	35	6	2	326	Mixed
NAE	59% / 33% / 8%	10	49	33	6	2	134	Mixed
SUV & BOF	63% / 34% / 3%	7	55	34	1	1	67	Strength
PT & C	57% / 39% / 4%	4	54	39	4	0	28	Mixed
Small FWD & RWD	58% / 37% / 5%	5	53	37	5	0	43	Mixed
Medium & Large FWD & AWD	48% / 36% / 17%	5	43	36	12	5	42	Mixed

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents 1	2	3	4	5	Number Responding	Standing
		Favourable		Neutral	Unfavourable			
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager. Total	69% / 25% / 7%	14	54	25	4	2	329	Strength
NAE	67% / 27% / 7%	18	49	27	3	4	135	Strength
SUV & BOF	78% / 16% / 6%	15	63	16	4	1	67	Strength
PT & C	71% / 29% / 0%	14	57	29	0	0	28	Strength
Small FWD & RWD	66% / 25% / 9%	14	52	25	7	2	44	Strength
Medium & Large FWD & AWD	60% / 28% / 12%	5	56	28	9	2	43	Strength
9100. As a result of the ESP/TMM training, I have created a technical development plan. Total	65% / 0% / 35%	65	0	0	0	35	480	Strength
NAE	68% / 0% / 32%	68	0	0	0	32	188	Strength
SUV & BOF	58% / 0% / 42%	58	0	0	0	42	102	Mixed
PT & C	58% / 0% / 42%	58	0	0	0	42	43	Mixed
Small FWD & RWD	78% / 0% / 22%	78	0	0	0	22	64	Strength
Medium & Large FWD & AWD	60% / 0% / 40%	60	0	0	0	40	63	Strength
9105. My technical development plan was enhanced by: A discussion with my supervisor/manager. Total	75% / 0% / 25%	75	0	0	0	25	308	Strength
NAE	79% / 0% / 21%	79	0	0	0	21	127	Strength

QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9106. My technical development plan was enhanced by: Interactions with my peers. — SUV & BOF	 73% / 0% / 27%	73	0	0	0	27	59	Strength
PT & C	 71% / 0% / 29%	71	0	0	0	29	24	Strength
Small FWD & RWD	 76% / 0% / 24%	76	0	0	0	24	50	Strength
Medium & Large FWD & AWD	 71% / 0% / 29%	71	0	0	0	29	38	Strength
Total	 54% / 0% / 46%	54	0	0	0	46	306	Mixed
9107. My technical development plan was enhanced: Through use of the TMM as a framework for determining appropriate technical development activities. — NAE	 49% / 0% / 51%	49	0	0	0	51	126	Mixed
SUV & BOF	 56% / 0% / 44%	56	0	0	0	44	59	Mixed
PT & C	 54% / 0% / 46%	54	0	0	0	46	24	Mixed
Small FWD & RWD	 59% / 0% / 41%	59	0	0	0	41	49	Mixed
Medium & Large FWD & AWD	 61% / 0% / 39%	61	0	0	0	39	38	Strength
Total	 72% / 0% / 28%	72	0	0	0	28	309	Strength
NAE	 72% / 0% / 28%	72	0	0	0	28	127	Strength
SUV & BOF	 78% / 0% / 22%	78	0	0	0	22	59	Strength
PT & C	 76% / 0% / 24%	76	0	0	0	24	25	Strength

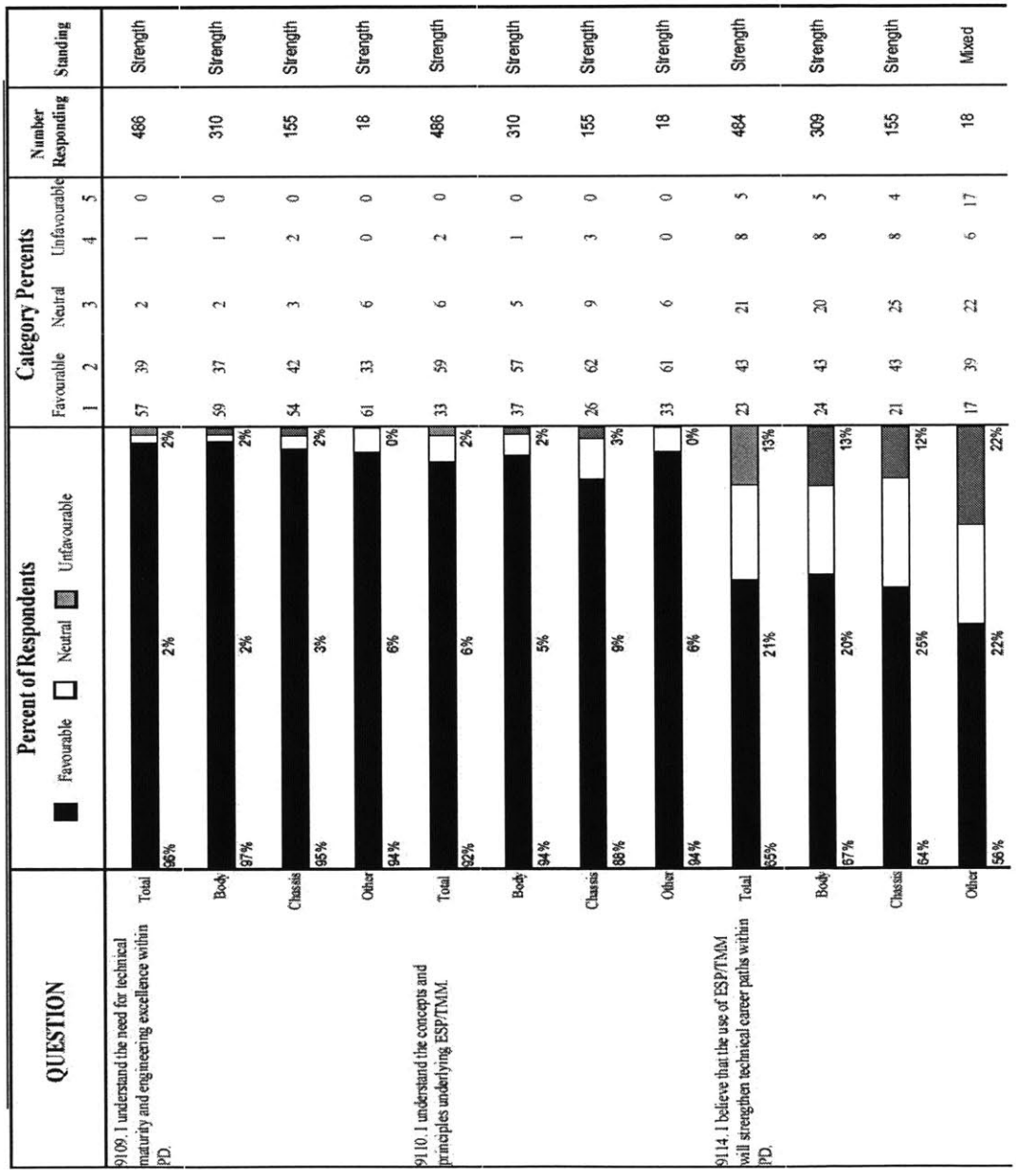
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9103. My technical development plan was enhanced: Through use of Ford Design Institute (FDI) resources.								
Small FWD & RWD	66% / 0% / 34%	66	0	0	0	34	50	Strength
Medium & Large FWD & AWD	74% / 0% / 26%	74	0	0	0	26	38	Strength
Total	45% / 0% / 55%	45	0	0	0	55	305	Mixed
NAE	43% / 0% / 57%	43	0	0	0	57	126	Mixed
SUV & BOF	51% / 0% / 49%	51	0	0	0	49	59	Mixed
PT & C	42% / 0% / 58%	42	0	0	0	58	24	Mixed
Small FWD & RWD	45% / 0% / 55%	45	0	0	0	55	49	Mixed
Medium & Large FWD & AWD	42% / 0% / 58%	42	0	0	0	58	38	Mixed
9104. My technical development plan was enhanced: Through use of Ford Learning Network (FLn) as an interface to the TMM.								
Total	28% / 0% / 72%	28	0	0	0	72	307	Weakness
NAE	28% / 0% / 72%	28	0	0	0	72	127	Weakness
SUV & BOF	26% / 0% / 74%	26	0	0	0	74	58	Weakness
PT & C	24% / 0% / 76%	24	0	0	0	76	25	Weakness
Small FWD & RWD	34% / 0% / 66%	34	0	0	0	66	50	Weakness
Medium & Large FWD & AWD	32% / 0% / 68%	32	0	0	0	68	38	Weakness

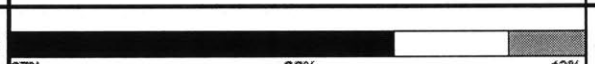
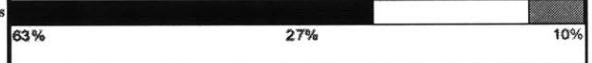
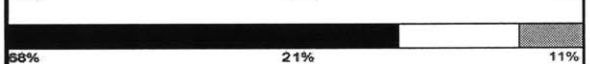
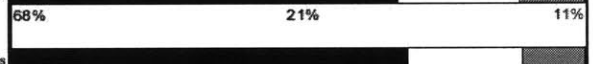
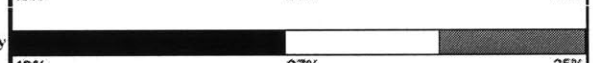
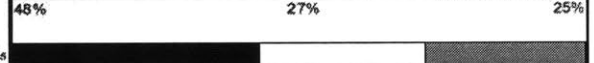
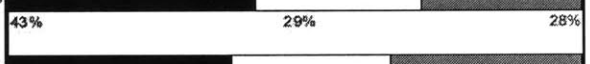
QUESTION	Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9123. My technical development plan was enhanced: Through use of the FLn self-inventory data and resulting learning solutions. — Total	25% / 0% / 75%	25	0	0	0	75	301	Weakness
NAE	23% / 0% / 77%	23	0	0	0	77	126	Weakness
SUV & BOF	21% / 0% / 79%	21	0	0	0	79	58	Weakness
PT & C	21% / 0% / 79%	21	0	0	0	79	24	Weakness
Small FWD & RWD	28% / 0% / 72%	28	0	0	0	72	47	Weakness
Medium & Large FWD & AWD	35% / 0% / 65%	35	0	0	0	65	37	Weakness
9171. Are you implementing your ITDP (Individual Technical Development Plan)? — Total	79% / 0% / 21%	79	0	0	0	21	305	Strength
NAE	73% / 0% / 27%	73	0	0	0	27	127	Strength
SUV & BOF	86% / 0% / 14%	86	0	0	0	14	59	Strength
PT & C	80% / 0% / 20%	80	0	0	0	20	25	Strength
Small FWD & RWD	79% / 0% / 21%	79	0	0	0	21	48	Strength
Medium & Large FWD & AWD	86% / 0% / 14%	86	0	0	0	14	37	Strength
9604. How useful is the ESP website for supporting your understanding of technical development within PD and related activities? — Total	42% / 35% / 23%	5	37	35	18	6	197	Mixed
NAE	40% / 36% / 25%	8	32	36	18	7	73	Weakness

QUESTION	Percent of Respondents Favourable Neutral Unfavourable	Category Percents Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
SUV & BOF	 58% 25% 18%	3	55	25	15	3	40	Mixed
PT & C	 38% 38% 25%	0	38	38	25	0	24	Weakness
Small FWD & RWD	 32% 44% 24%	8	24	44	20	4	25	Weakness
Medium & Large FWD & AWD	 31% 46% 23%	0	31	46	12	12	26	Weakness

Appendix M

AUGUST 2003 RESPONSES BY FUNCTIONAL AREA



QUESTION		Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9173. I believe the ESP/TMM project will strengthen my team□s ability to meet business needs.	Total	 67% 20% 13%	22	45	20	9	4	484	Strength
	Body	 69% 16% 15%	24	45	16	10	5	308	Strength
	Chassis	 63% 27% 10%	19	45	27	8	2	155	Strength
	Other	 56% 22% 22%	17	39	22	11	11	18	Mixed
9111. I know how to use the TMM as a framework for facilitating technical development.	Total	 68% 21% 11%	15	53	21	9	2	485	Strength
	Body	 68% 21% 11%	17	50	21	9	2	309	Strength
	Chassis	 69% 20% 11%	10	59	20	10	1	155	Strength
	Other	 61% 28% 11%	17	44	28	11	0	18	Strength
9600. I am satisfied with the training resources that are available to meet my technical needs.	Total	 46% 28% 26%	8	37	28	19	7	484	Mixed
	Body	 48% 27% 25%	9	39	27	18	8	308	Mixed
	Chassis	 43% 29% 28%	6	37	29	21	7	155	Mixed
	Other	 39% 28% 33%	17	22	28	33	0	18	Weakness
9112. I believe that using the TMM will enhance my technical depth within my functional area.	Total	 60% 25% 15%	16	44	25	10	5	484	Mixed
	Body	 60% 23% 16%	17	43	23	11	6	308	Strength

QUESTION		Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9598. The new Senior Engineer classification (SG 08) is a step in the right direction toward creating more opportunities for a technical career path in PD.	Chassis	59% / 30% / 11%	14	45	30	9	2	155	Mixed
	Other	56% / 17% / 28%	11	44	17	11	17	18	Mixed
	Total	78% / 13% / 10%	28	49	13	6	4	485	Strength
9599. The new Technical Specialist positions (which are implementation focused) are creating more opportunities for technical career paths in PD.	Body	78% / 15% / 7%	30	48	15	5	3	310	Strength
	Chassis	79% / 9% / 12%	27	51	9	8	4	154	Strength
	Other	61% / 17% / 22%	17	44	17	11	11	18	Strength
	Total	65% / 24% / 10%	23	43	24	7	3	483	Strength
9605. As a result of PD's focus on ESP/TMM, I am interested in continuing on a technical career path.	Body	66% / 23% / 11%	22	45	23	7	3	307	Strength
	Chassis	65% / 26% / 10%	25	39	26	7	3	155	Strength
	Other	56% / 33% / 11%	22	33	33	6	6	18	Mixed
	Total	51% / 32% / 17%	17	34	32	12	6	479	Mixed
	Body	50% / 31% / 19%	18	31	31	14	6	305	Mixed
	Chassis	53% / 34% / 13%	14	39	34	9	4	153	Mixed
	Other	44% / 33% / 22%	17	28	33	0	22	18	Mixed

QUESTION		Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9182. I believe that a functionally-based PDC5 will enhance my technical development.	Total	44% / 40% / 15%	11	33	40	11	5	336	Mixed
	Body	42% / 40% / 17%	12	30	40	12	6	215	Mixed
	Chassis	49% / 41% / 11%	8	41	41	10	1	111	Mixed
	Other	22% / 44% / 33%	11	11	44	0	33	9	Weakness
9169. Is technical depth/competence emphasized more today than it was at this time last year?	Total	73% / 0% / 27%	73	0	0	0	27	483	Strength
	Body	69% / 0% / 31%	69	0	0	0	31	307	Strength
	Chassis	81% / 0% / 19%	81	0	0	0	19	155	Strength
	Other	72% / 0% / 28%	72	0	0	0	28	18	Strength
9172. Do you feel that you are able to coach or help a team member in their technical development?	Total	78% / 0% / 22%	78	0	0	0	22	483	Strength
	Body	77% / 0% / 23%	77	0	0	0	23	308	Strength
	Chassis	81% / 0% / 19%	81	0	0	0	19	155	Strength
	Other	76% / 0% / 24%	76	0	0	0	24	17	Strength
9590. During 2003, I have had a technical development discussion with my supervisor/manager.	Total	69% / 0% / 31%	69	0	0	0	31	482	Strength
	Body	69% / 0% / 31%	69	0	0	0	31	308	Strength

QUESTION		Percent of Respondents (Favourable / Neutral / Unfavourable)	Favourable 1	Favourable 2	Neutral 3	Unfavourable 4	Unfavourable 5	Number Responding	Standing
9591. During the technical development discussion, the ITDP was used as a tool to guide my technical development.	Chassis	72% / 0% / 28%	72	0	0	0	28	153	Strength
	Other	33% / 0% / 67%	33	0	0	0	67	18	Weakness
	Total	65% / 0% / 35%	65	0	0	0	35	323	Strength
	Body	60% / 0% / 40%	60	0	0	0	40	207	Strength
9117. This technical development discussion was better than previous ones.	Chassis	72% / 0% / 28%	72	0	0	0	28	109	Strength
	Other	83% / 0% / 17%	83	0	0	0	17	6	Strength
	Total	58% / 35% / 7%	8	50	35	6	2	326	Mixed
	Body	57% / 36% / 7%	8	49	36	5	2	207	Mixed
	Chassis	60% / 32% / 7%	6	54	32	6	1	111	Strength
	Other	50% / 50% / 0%	33	17	50	0	0	6	Mixed
9118. Overall, I am satisfied with the quality of the discussion that I had with my supervisor/manager.	Total	69% / 25% / 7%	14	54	25	4	2	329	Strength
	Body	65% / 26% / 9%	14	52	26	6	3	211	Strength
	Chassis	75% / 22% / 3%	14	62	22	2	1	110	Strength
	Other	67% / 33% / 0%	50	17	33	0	0	6	Strength

QUESTION		Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9100. As a result of the ESP/TMM training, I have created a technical development plan.	Total	65% / 0% / 35%	65	0	0	0	35	480	Strength
	Body	69% / 0% / 31%	69	0	0	0	31	306	Strength
	Chassis	61% / 0% / 39%	61	0	0	0	39	154	Strength
	Other	17% / 0% / 83%	17	0	0	0	83	18	Weakness
9105. My technical development plan was enhanced by: A discussion with my supervisor/manager.	Total	75% / 0% / 25%	75	0	0	0	25	308	Strength
	Body	73% / 0% / 27%	73	0	0	0	27	210	Strength
	Chassis	79% / 0% / 21%	79	0	0	0	21	94	Strength
	Other							3	Insufficient Data
9106. My technical development plan was enhanced by: Interactions with my peers.	Total	54% / 0% / 46%	54	0	0	0	46	306	Mixed
	Body	53% / 0% / 47%	53	0	0	0	47	209	Mixed
	Chassis	55% / 0% / 45%	55	0	0	0	45	93	Mixed
	Other							3	Insufficient Data
9107. My technical development plan was enhanced: Through use of the TMM as a framework for determining appropriate technical development activities.	Total	72% / 0% / 28%	72	0	0	0	28	309	Strength
	Body	69% / 0% / 31%	69	0	0	0	31	211	Strength

QUESTION		Percent of Respondents (Favourable / Neutral / Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9103. My technical development plan was enhanced: Through use of Ford Design Institute (FDI) resources.	Chassis	77% / 0% / 23%	77	0	0	0	23	94	Strength
	Other							3	Insufficient Data
	Total	45% / 0% / 55%	45	0	0	0	55	305	Mixed
	Body	44% / 0% / 56%	44	0	0	0	56	208	Mixed
	Chassis	45% / 0% / 55%	45	0	0	0	55	93	Mixed
	Other							3	Insufficient Data
9104. My technical development plan was enhanced: Through use of Ford Learning Network (FLn) as an interface to the TMM.	Total	28% / 0% / 72%	28	0	0	0	72	307	Weakness
	Body	27% / 0% / 73%	27	0	0	0	73	210	Weakness
	Chassis	29% / 0% / 71%	29	0	0	0	71	93	Weakness
	Other							3	Insufficient Data
9123. My technical development plan was enhanced: Through use of the FLn self-inventory data and resulting learning solutions.	Total	25% / 0% / 75%	25	0	0	0	75	301	Weakness
	Body	25% / 0% / 75%	25	0	0	0	75	206	Weakness
	Chassis	21% / 0% / 79%	21	0	0	0	79	91	Weakness
	Other							3	Insufficient Data

QUESTION		Percent of Respondents (■ Favourable □ Neutral ▨ Unfavourable)	Category Percents: Favourable 1	2	Neutral 3	Unfavourable 4	5	Number Responding	Standing
9171. Are you implementing your ITDP (Individual Technical Development Plan)?	Total	79% / 0% / 21%	79	0	0	0	21	305	Strength
	Body	76% / 0% / 24%	76	0	0	0	24	208	Strength
	Chassis	85% / 0% / 15%	85	0	0	0	15	93	Strength
	Other							3	Insufficient Data
9604. How useful is the ESP website for supporting your understanding of technical development within PD and related activities?	Total	42% / 35% / 23%	5	37	35	18	6	197	Mixed
	Body	44% / 33% / 23%	3	41	33	20	3	122	Mixed
	Chassis	35% / 42% / 23%	5	31	42	15	8	65	Weakness
	Other	56% / 22% / 22%	22	33	22	11	11	9	Mixed