**Rapid Product Development - Issues and Opportunities Joseph R Adamski**

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This paper reviews:

* the elements of a hybrid New Product Development model,
* the importance of new products to a business,
* thoughts on the true cost of design activity,
* what factors determine the speed of market entry,
* the value of ideas to the organization and how to qualify these ideas,
* some thoughts about business plans,
* research and development,
* intellectual property,
* design engineering and,
* success of the model.

**1 What is New Product Development?**

New product development is the most important business activity that can occur in a Company. The expected result of the new product development activity is an increase in sales and profit, improvement in strategic position for the company, or more tangibly, reduction in overhead costs. New product development is probably the most difficult activity a business will undertake because it is both a **multidisciplinary** and **interdisciplinary** process.

New Product Development is a relentless Act of Will (Freedman, Hapgood).

The importance of New Product Development is rooted in and stems from:

1. a practical understanding of market type, voiced and unvoiced consumer needs,

market share potential, new product concept robustness,

1. identification, hiring and motivation of a highly qualified "development team",
2. intelligent investment in capital equipment,
3. prediction and realization of profit measured as Return On Investment (ROI) or Return On   
   Sales (ROS).

The speed or agility of a company to conceive, develop, manufacture, market, sell and service a new product is the strongest measurement of the vitality of the company. Growth and loss resulting from new product development is essential to the future of the company. It is good for customers. It is good for the employees. It is good for stockholders.

Because of the intensity of new product development activity, management and team expectations, and accountability for development costs and eventual return on investment, organizations with high operational values will fare better in the new product development process. For example, Dacor's Company Value is to honor God in all that they do, by respecting others, by doing good work, by helping others, by forgiving others, by giving thanks and by celebrating our lives. When teams operate under guiding principles such as these, almost anything is possible. These values indicate that people and their quality of life are of over-riding importance to the business and especially the new product   
development process.

**2 Why are new products soooo important?**

The growth potential of a Company results from its ability to develop new products. The rate of growth is often linked to the *class* of product being developed – either, 1) routine, 2) reconfigured, or 3) innovative.

Routine levels of business growth can occur from routine product development activity. In-house knowledge of both components (elements of the design) and how to assemble them characterize this class of product development. Color changes to products, handles or decorative trim styling redesigns, accessory development, improvement in power ratings or efficiency of the product can be considered routine design activities. Routine product development is generally the least expensive investment, but unfortunately, provides the smaller profit margins. When considering the manufacture of products to be sourced (cross labeled), routine product designs that broaden the product family improve profitability by reducing fixed and variable overhead manufacturing costs.

Growth can occur from design activity where the components are known but there is uncertainty regarding how to assemble them. Some examples of reconfigured products in this design class are a "convection microwave oven" or "front-load washer" or "forced hot-air furnace", etc. This *class* of design activity and resulting product often requires moderate financial investment and provides moderate new product profitability margins.

Accelerated business growth can occur resulting from successful innovative new product development activity. This *class* of design is one "where you don't know the components and don't know how to configure them" when you first start. Some examples of innovative products are the "microwave oven", "optical disk or CD player", "wireless or cellular telephone", or "personal computer". Financial investment in innovative growth products can be substantial; the development period can oftentimes be long, and while very high new product profit margins can occur, initially there may be several years of financial loss.

**Maintenance is Important too!**

Regardless of what class of product you chose to develop and manufacture, there is always some portion of the product that must obsessively be maintained. By maintained, I mean the design must be adjusted to improve manufacturing costs, optimize assembly procedures, improve parts commonality, reduce warranty costs, or create market freshness.

Easy recognition of visual aspects of a Company Brand is extremely important to the lifetime and the quality of products and sister product lines. Periodic evolution and renewal of the freshness or quality that first attracted and then secured new customers is essential to the longevity of the product and continued profitability. While this product maintenance activity is generally viewed as unexciting by traditional development teams, it can be rich in career opportunities for appropriately talented and incentivized employees.

**Defense**

Sometimes, new products must be developed in defense of competitive initiatives. Allow me to explain. To preserve your initial development investment, if Company B's dishwasher cleans in 1/2 the time, your company's dishwasher must clean in a *slightly shorter* amount of time. Product specifications, design implications and resulting manufacture for defensive innovation are sometimes not obvious - just how short must the time period be to be significant? But, without the defensive innovation, market share may be lost.

**3 The Cost of Design Activity**

One successful model of design activity graphically describes development issues and design choices. It is called *"Problem Decomposition with Constraint Propagation ''.* This representation, borrowed from computer scientists in the Artificial Intelligence community, depicts a design as a tree-like assembly. A design - for a tricycle - can be completed if a tubular steel frame, vinyl seat, chrome handlebar, rubber pedal and wheels can be designed. Each sub-problem, such as the design of the vinyl seat - can similarly be broken down. The design for a seat can be completed if the support structure, covering, suspension, height and tilt adjustment elements of the seat can be designed. Wheels may be solid or inflatable. Inflatable wheels cost more than solid wheels, but when choosing solid wheels, a spring suspension for the tricycle seat is required, thus increasing the cost of the tricycle.

The simple tricycle model points out the necessity for product designers to think of the problem as broken down into smaller problems. Some branches of the tree provide shelter for other non-related portions of the design. Because of the non-connectedness of branching sub-problems, oftentimes they need not be simultaneously considered. The hard work of selecting solutions is suspended until an overriding global constraint is activated, releasing optimized design solutions for all the sub-problems. **Once design choices are identified and selected, the major work of the new product development team is complete.**

**Initial Concept (Does Higher Cost Require Higher Efficiency?)**

Usually a small number of people work during the initial weeks of research and development of a new product concept. This team can be likened to the sprinters of a track and field event. It is their responsibility to thoughtfully establish the essential content and extent of the product. This content and robustness is expressed as design features and performance ability measured from the consumer's standpoint, as well as in material costs, design extendibility, maintainability, field reliability and universality - measured from the company's standpoint. Because of the small size of the initial team, it is clear to management who is working on the project, how much is being accomplished and if this activity and accomplishments are being communicated to the rest of the   
company.

The R&D team must be relentless sprinters - technically agile, able to assimilate and translate consumer needs into hardware, experimentalists, "plusers" or builders, goal- oriented "expert generalists". The technologies they deal with can be as simple the color of product, or shape and smoothness of a handle or the design of a pouring lip of a carafe. They can be as complex as designing ASICs (Application Specific Integrated Circuits) or self-tuning electronic controls.

In the early phases of development, it is easy to see that every day gained in the schedule is a day sooner in production. Every day lost directly decreases sales, income and profitability for the new product development Enterprise and the company.

The outcome of the Research and Development effort and the efficiency of the follow-on activity depend on extensive and "well-communicated" documentation. This documentation can take the form of lists or graphic representations of design choices and decisions, experimental data, performance requirements with practical technical embodiments, as well as related costs and most importantly, the design (drawings, parts lists, materials, assembly techniques, test programs, etc.)

As the R&D design team salary is expensive, the team must be efficient. Time can be wasted when responses to product configuration questions do not occur quickly. Inefficiency occurs searching suppliers, placing orders, tracking delivery of sample parts, or locating and filling out office forms. Time is wasted holding unfocused or unproductive meetings, struggling with poor telephone systems and slow computer workstations. It can be wasted on inadequate experimental tools. The old saying - "The Engineers with the Best Tools Win" is true.

The R&D sprinters are backed up or supported by an extended product development team. This extended product development team is composed of "long distance marathon runners". The extended product development team members represent resources or technologies essential to successful completion of the project. The extended product development team carefully completes the details of the design.

**Product Maintenance (retooling)**

Not only must the design team know how to configure and assemble design elements, they must also be familiar with the cost of current production tooling, and practical extendibility of soft and hard tools. The team must be aware of penalties or risks associated with unrecoverable design changes could which render the tool useless and the production line stopped.

Often times, to minimize the financial investment in the Enterprise or to accelerate payback, modest redesign of the product may be undertaken to “freshen the look". The "personality" of an appliance is a complex system of interrelated performance, manufacturability, and reliability elements. Product maintenance is accelerated with clear definition of the scope or boundaries of the activity at the start of the project (as is the case in most redesign activity), and technical monitoring or assessment of progress in achieving the goals and maintaining the "personality" of the appliance. Routine redesign will become slow and even dangerous if changes that the design team sponsors interfere with the "appliance personality".

The best personnel to apply to new product development effort focused on redesign are "evolved experts". These people, often catching their career "second wind" are most familiar with how and why the appliance operates the way it does, and what impact and extent changes may have on the personality of the appliance. The father of a good friend of mine used to say, "I may be an old man, but I have a good memory". It is the cultural memory of mature new product development personnel that must be called into play to simplify, as well as guarantee, the success of redesign activities.

Recall/Reliability **(repair, redesign)**

Effort must be spent in understanding and designing-in reliability. Reliability cannot be added as an afterthought, because the most efficient designs (cost, performance, manufacturing, or service efficient) occur when time is placed in integrating both component and system reliability. For example, consider a component whose MTBF is related to keeping its temperature as low as possible. Support structures for the component to keep it from swaying under load can suspend - as well as conduct heat away from the component. If additional brackets or fasteners cost too much money, support elements formed into sheet metal though pierce and fold operations, or molded   
permanently into plastic parts may be more cost effective.

**Market Share Development**

Design of the new product for follow-on family extension is important, especially when considering that a portion of the Company will become and remain dedicated to the Enterprise for many years. The robustness of the design measured as operating performance, applicability or market importance is essential. The robust product is readily made bigger, smaller, wider, deeper, hotter, colder, faster or less expensive to support the creation and retention of market share. Consideration of the need for this robustness at the beginning of the Enterprise improves profitability, and allows Product Maintenance discussed earlier to occur as part of the inevitable lifecycle of the product.

**4 What Determines the Speed Of Market Entry - Agility!**

Contrary to popular opinion that Engineering always slows down progress, there are a number of factors which affect the *speed of market entry* of a new product. I call the ability of a team to constructively react to changing input as agility.

For the Enterprise to be successful the business must be financially prepared to invest in market studies, innovative thinking, design development, test, manufacturing tooling, etc. It must be able to allocate and reallocate funds rapidly and correctly. It must be able to take advantage of the employment availability of highly competent designers, an injection-molding machine, or land for a new building.

The Marketing team must be able to create and maintain a position in the market place under rapidly changing competitive conditions. The launch of new products must be managed - the most agile departments able to predict the appearance of competitive products and activate responses already developed and "in the can".

In addition to supplying the concrete elements of innovative ideas, the technical team must also be able to respond to rapidly changing competitive product offerings and provide a bridge from R&D to the manufacturing team. This can only be accomplished by "working out" before the challenge appears. Physical and mental exercises that educate designers outside of the scope of present assignments sharpen their abilities to respond to unforeseen technical challenges. This "workout" takes several forms - education, department dialog, competitive product teardowns, peer conducted design reviews, patent portfolio generation, or attendance at supplier conferences.

Every customer wants to own a unique appliance that best suits his or her needs. Every manufacturer wants to build the same product the same way, every day. Manufacturing agility may be measured in terms of speed of order processing, management of supplier deliveries, production schedules and finished goods shipping. Parts must be capable of being purchased from different suppliers or fabricated on different machines to balance loading if necessary.

Manufacturing agility may also be measured in minutes or hours to change dies or tools,   
or set up new lines, or ramp-up production rates.

The technogility, that is - technical agility - of an appliance manufacturer to react or evolve new technologies is essential for sustained presence in the market and possible growth. Technology Gatekeepers - highly skilled personnel who communicate to higher and lower management become essential in enabling this technogility and turning it into profit.

Finally, for a Company to be agile and for the Enterprise to benefit from this agility, its new product design personnel must be highly skilled at communication. Without it, activities, which exist at the discipline borders are poorly executed, and the "play" fails because the "players" may not be in the right position to react.

**5 Growth Objectives**

Just as some people prefer a coffee and a roll in the morning and others, a Belgian Waffle with Strawberries and Whipped Cream - some organizations are conservative and others are skilled at risk taking. The profitability of a new product development activity often results from marketing and sales of high quality, innovative products. Innovative new products often enjoy little or no competition in the early stages of launch - typically a critical financial situation for the risk taking company. While too little competition is also not good, too much places the high profitability of the breakthrough product at risk.

More conservative, lower margin new product offerings can provide slow but steady growth, if the manufacturing techniques, sales and service are of similar quality. This means the product may be simple to sell, easy for the consumer to become comfortable with its features and benefits, or so uncomplicated that it is reliable or easy to service. These mainstay products may be manufactured in higher volumes, helping reduce factory operating costs, as well as supporting a workforce that can be re-deployed if higher margin products are not in as much demand.

**6 The Value of Ideas**

Ideas shape our daily life. They have a life of their own. They invigorate us. Ideas cause us to reflect. They take us to places people may have never talked about. They shape our attitudes, and can motivate or demotivate us. They are essential to the new product development process because the creation of ideas - and the deliberate evolution of ideas - is the most efficient development activities possible.

Very few things evolve quicker than ideas, especially when they emerge and are transformed through cognitive activity of others - this observation applies to both good and bad ideas. I've often held that while sometimes the children of ideas may not be too valuable, the grandchildren may be. This rule prohibits premature rejection of ideas that might contribute to viable design solutions. Reasoning this way requires the thinker to maintain potentially "false" concepts and recombine them as practically as possible. For example, if a four-wheeled skateboard is a very compact, engineless automobile, then a   
very compact, engineless motorcycle might be a two-wheeled rolling means for transportation - perhaps a scooter or inline skate or two-wheeled skateboard (recently invented!).

In some part of the idea evaluation process, the team needs to throw darts at the concept- to really test if it is rational, solves a market need, is technically achievable, can be manufactured, profitable for the business, and a consumer "WOW".

Shared ideas (especially if supported visually) have tremendous power. Depending on the Company cultural makeup, there can be tolerance or intolerance for this concept. Clearly, ideas must be transformed into reality - hopefully as rapidly as possible. The difficulty in innovative product design occurs if no one in the team, or perhaps anywhere in the company, has experience with the new combination of design elements and or how they need to be configured. This fear must be embraced and understood to be an essential element of highly profitable innovative design.

As suggested earlier, the three primary design activities – 1) routine redesign, 2) reconfiguration, and 3) innovative design all have an important role to play in the life and maturity of a Company. As long as the maturity of a product is realistically considered when discussing it - the development effort will continue to show sustained productivity. Expecting "results" too soon, or "yet untested" performance too high, or potential profit margins too low - especially for a new appliance product which has never been seen - can lead the team into dark, unproductive alleys. Sometimes the product just is what it is. Given the skill and composition of the development team, this is probably ok. (It will make money and be successful.)

**Qualifying Ideas**

So, if given the fact that ideas are the best and most efficient way to conceive and evolve a new product design, where - where are these ideas to come from – and, is one idea as important as another?

Generally, organizations are brimming with ideas. Thinkers travel to the foothills of mountains and gaze out over the cityscapes and ideas come. They hold offsite meetings and more ideas come. They wake up at 1:00 a.m. or 3:00 a.m. and still more ideas come. Countless and long, often ambiguous lists of product ideas are made and reviewed - lists that contain wonderful performance improvements, innovations or re-combinations of technologies (like a microwave hair dryer, or an iced coffee maker).

The value of any idea, unlike beauty present in a fashion show, is not in the eye of the beholder - but in the hands of the beholder. The only way that an idea is transformed into reality is through an individual's Act of Will. Without this Act of Will, paper, calculations, alternatives, and profitability dreams exist but are not realized.

So, first, the new product idea must fall into the head and hands of a doer - someone who knows how to use technology and can to transform ideas into reality. Then, the new product must be championed, sustained, worked on - willed into existence by some one person or persons. Therefore, the difficulty with "new concept lists" with hundreds of ideas is that they necessarily require hundreds of champions exhibiting the unique leadership character by which teams form - and labor to create new products and transform ideas into reality.

This is not possible. Nor can an idea be easily created, extended, "fleshed-out" or made more robust, or embodied with sheet metal without the help of someone burning with desire to achieve this end, knowing in advance that the effort may not be rewarded with success (even if the rules of science are followed).

A misunderstood idea often cannot be transformed into a tangible assembly of components, sheet metal, fasteners, and paint that we call an appliance. It goes unfulfilled. That is why it is so critical that designers depict their concepts clear enough so that all understand - and the recipient listen carefully before offering criticism or judgment.

The best new product development team members are able to "see" the idea as a completed entity - a design with form and function, fabricated, ready for the carton and shipment to the customer. That is that goal, that image which represents all the activity between the idea and carton which must be accomplished for the Enterprise to be successful. It is this ability which places the new product development team at the top of the list of resources able to qualify the viability of new product ideas.

It is here where new ideas may be qualified.

**7 Business Plan Development**

The business plan helps the organization understand the breadth or scope of the new product development activity. It details the size of the investment, the length of time and rate of sales necessary to return the investment as well as the profitability in the near and out years.

The business plan accounts for costs of the new product development team, market size and growth potential. It includes development costs (design, tests, engineering models, regulatory agency approvals, prototypes, field units, reliability units), and manufacturing costs (capital equipment, hard and soft tooling, supplier investigation and qualification, quality assurance, procedures, etc.). It includes cost of market development activities such as focus groups, and advertising.

For organizations unfamiliar with the practice of developing business plans, it places into perspective the new product development activity compared to similar activities in progress at the Company. The company new to business plans should create a plan for an already "successful" new product as a reality check for undertaking new product development projects.

For organizations more familiar with business plans, it is an immediate indicator of the ability of the effort to return value - as dollars in time. It enables in a practical fashion, the fair allocation of usually limited financial resources - regardless of the oratory skills of the project manager, or the timidity of the fledgling research scientist.

Developing and executing a business plan is a "best practice" for new product development.

**8 Research and Development (reducing uncertainty)**

Almost every organization follows a Research and Development process that includes the   
design, fabrication and test of models. These models are generally classified as Feasibility, Engineering and Concept models. In the very early idea phase, a Feasibility Model demonstrates the opportunity a new concept can create for the company. The opportunity might be refrigerator energy conservation, improved clothing care, reduced pre-heat time, more uniform broiler browning, etc. The hardware used in the Feasibility Model may be simple or complex. The intent is solely demonstration - generally cost is no object – but it is usually low anyway.

The Feasibility Model demonstrates: 1) performance capability and how it might compare to similar products or technologies, 2) unit and volume costs, and 3) the potential of these design elements to become a technically viable addition to a new product design - to become the "new idea".

Several Engineering Models may be constructed. **Each Engineering Model resolves an   
uncertain feature of the product by exhibiting solutions that reduce this uncertainty to a satisfactory level.** An Engineering Model front load washing machine may achieve very high spin speeds. The design element under test may enhance airflow through the clothing to accelerating drying. Other elements of the design may be well understood - it is for that reason they are ignored in Engineering Models. The reasoning behind this corollary is that we often do what we can do - and leave the hard tasks to the very end of our work effort. Sometimes, and especially in new product development, it is too late to address design or performance uncertainty at the end of the project because too many complex and interrelated design decisions may have already been made. The goal of the Engineering Model is to more concretely characterize how an innovative (uncertain) feature of the new product must be designed to satisfy the intended product specification.

Other Model types may be created, such as Visual Models or Ergonomic Models. **Each should be focused at demonstrating and supporting the reduction of an uncertain feature**. Why else build one? Some models are perfect for Trade Shows. They can be fabricated to look and feel like the new appliance straight from the production line - well ahead of the production date. Other models are valuable for Marketing Focus Groups - where specific features can be evaluated by prospective consumers and traded for others.

Only a few Concepts Models need ever be fabricated. The primary intent of the Concept Model is to serve as a tool convincing Company management that the new product concept is fully achievable. As a hand-fabricated unit, Concept Models are generally expensive. As they are demonstrated, they have no features that cannot be handled as routine, business practice. The design configuration, supplier base, performance features, estimated cost; reliability and serviceability are all understood sufficiently to support the goal of the Model.

In all this model building activity, management must be keenly aware that things will go wrong - the model will burn, arc, whine, tip over, use too much energy or cost too much. The organization must provide "freedom to fail". If the models are correctly conceived, the best minds of the organization are working to solve problems no one has ever solved. Bright minds are challenged during an emergency; they work so close to the edge of understanding that when things don't turn out as planned they have what I call "DNA Moments". **Is it through these failures that learning occurs**. Focused development undertaken by bright minds without penalty for failure will usually reap the greatest benefits.

In any event, the more models the merrier. Valuable information is learned from the design, assembly, test, consumer reactions, transport on trucks, resource management, and configuration activity - the list continues for organizations willing to invest early in the new product development program to accomplish something they have never done before.

**9 Intellectual Property Development**

Intellectual Property is a battle shield, a secret weapon, a motivational tool, a necessity and sometimes, of intangible value. Patents and trade secrets capture and protect the spirit of the Enterprise. If the design of the new product under development can be patented, the value of the effort is better protected. As discussed earlier, innovative new product development is perhaps the highest risk business activity an organization can undertake. IP often allows the company to place the investment in a steel safe. While no plan is perfect, in the unlikely event that a product launch must be suspended due to market or economic conditions, IP preserves the intent of the effort for a "product eternity" (perhaps 20 years).

Patents are good morale boosters for marketing, sales, engineering, manufacturing and service personnel capable of creatively shaping the design of a new product. While almost every patent can be designed around, the words "this product is patented" have a very high value to consumers. These words show the world that your company possesses the intellectual ability, perhaps even the freedom, to achieve something never done before. The consumer often wants to participate in owning this creative uniqueness. Patents can be used to carefully extend a company's intellectual property. Redesign which solves problems present in current production can often form the basis of a patent - especially if the solution is crafted to be novel, "not obvious to one skilled in the art", and serve a useful purpose. A Dacor patented innovation called the Butterfly Heating Element created a unique convective airflow - the innovation, a response improving the already in-production "hidden" heating element.

Depending on the creativity, availability and priorities of the development team, designs and resultant patents can sometimes be obtained which not only cover art which the company would like to manufacture for profit, but also cover art which the competition might use to sell against you.

The creation of Intellectual Property during development of the new product is critically important to the success of the Enterprise. Nothing is more important to the success of an Idea than widespread acceptance. While this acceptance comes in many forms, (engineering or market validation, competitive market entry of a product with similar attributes, etc.), the United States or European Patent Offices lend early and substantial credence to the new product concept. It is this moral support which allows the development team to weather the difficult tasks of innovating, convincing management that the activity is valuable and of the highest priority, as well as validating the investment of time and energy of a professional career.

Trade Secrets are difficult to establish and maintain in the Appliance Industry.   
Procedures that can effectively safeguard the trade secret are usually not practical. Component suppliers often serve several masters and sometime must have intimate understanding of techniques for design or manufacture of a product to be useful to the project.

Perhaps the most effective deterrent to widespread communication of a Company's new product objectives is the Confidentiality Agreement. While it is generally and incorrectly interpreted as a supplier's license to discuss technology developments without mentioning *Your Company's* name, the most effective deterrent is for the design team to practice "abstinence" - only information sufficient for a supplier or consultant to provide the resulting component or assessment should be shared. This ***information hiding*** limits the potential for your competition learning how quickly you will be in the marketplace, with what technology, at what price.

**10 Design Engineering**

The workhorse of the New Product Development activity is Design Engineering. These specialists create design drawings, validate that the product meets marketing specifications, obtain regulatory agency approval of the product, and support transition of the design to production. While some organizations "design by the supplier", the company able to create and maintain a Design Engineering department capable of fundamental engineering through calculation, design for fabrication, data acquisition through tests and verification will be more successful than a company that cannot. Specialists, generalists and systems personnel are essential to the successful design   
engineering department.

To accelerate the market launch of the innovative new product, the Design Engineering team must be able to quickly understand the intention of the Research and Development team, translate these intentions into reasonably manufacturable elements and communicate these elements to the manufacturing team.

A more subtle and valuable new product development activity is accomplished by a subset of the Design Engineering team often known as Sustaining Engineering. This group has the most intimate understanding of how and why an appliance is designed, manufactured, operates and breaks, of anyone in the organization. It is this intimacy with the design that allows product improvements that have predictable performance impact, and substantially improve the profitability of the product by reducing manufacturing or warranty costs.

One way to acquire, motivate and retain Engineering Professionals is to cycle them through various Teams during their careers to broaden capabilities as well as provide fresh insight into problem solving. Just as certain R&D personnel can support Design Engineering, others in Design Engineering are well suited to transition the design to the factories, and still others better skilled in manufacturing seek an opportunity to innovate in a creative environment. This should be allowed to occur in a Company.

The results of R&D and the needs of Manufacturing are best expressed and understood on a prototype assembly line. Here, designs are translated into sheet metal, assembled; prints are checked for correspondence to drawings and corrections made. All company disciplines participate in this meeting place - R&D, Engineering, Manufacturing, Service, Sales and Marketing. Units made on this prototype line can serve as early reliability test units, photographic models, pre-field test units, or agency test units.

The field test of a product is often misunderstood. Some design elements of a new product are easily changed, some are not. Compare the idea of modifying the suspension system of a tilt-axis washing machine to that of changing the color of the appliance from white to bisque. The intent of the field test is not to validate that the product works, or that it will work for a long time - this validation should already be accomplished in the laboratory. One goal of the field test may be to fine tune design elements that can be tuned - such as knobs, handles, colors, installation instructions, cleanability, cooking recipes, etc.

The field test provides useful marketing, sales and advertising information. It validates how well the new product development team has performed, and allows the Sales team first-hand knowledge of how the appliance is perceived by the customer.

**11 Walking the Talk**

A new product development model is most valuable when it is followed. At one appliance company, several key additions to the traditional approach have been made. One of these additions is to expand the importance of regulatory agency testing to include a Consumer Compliance Test - which exercises the product from the standpoint of the Company Consumer. This Compliance testing is revisited two additional times to guarantee that the design has not drifted from the intention of the original marketing specification. A recent all-gas range product development program followed this approach during an eight-month period - with good success. As expected, early input from manufacturing, service, sales and marketing created buy-in for the goals for the product, so that by the end of the program, there was little uncertainty in the performance, marketing approach, price positioning, or expected reliability of the product.

The greatest enabler of new product development is communication; the greatest deterrent to successful new product development is fear of the unknown. In my experience as an inventor, I've discovered that few people are skilled (sometimes myself included) in visualizing a concept, in translating ideas into reality, in communicating the difference between what occurs in a model and what can occur in production. Widespread communication and alignment is essential to success of the new product.

**Summary**

New product development is difficult, rewarding, requiring the best from many company disciplines, an oftentimes-expensive undertaking, sometimes prone to failure. Its speed is determined by the agility of the team members and the company. There is considerable value in thinking and in protecting your thoughts with patents.

Insightful awareness - of the needs of the person you are and of the person you are communicating with, of the respect team members and you desire, of your ability to achieve the impossible alone and with others, of our call to forgive mistakes and move on, of the need to taste and see the goodness of life with friends and families - these elements are the foundation of a successful new product development process.

The superstructure which the team places on this foundation - the New Product Development Process - best serves the Company if it is practical and profit motivated, accelerates decision making formed from real data, is timely and perhaps above all, fun.