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FINAL REPORT

DEVELOPING AN INVENTOR SUPPORT SERVICE WHICH PERFORMS EAR .Y STAGE MARKET AND MANUFACTURING EVALUATIONS

October 1991

Prepared By

Innovative Products Research & Services, Inc.
Lexington, MA 02173

Under the Support of U.S. Dept. of Energy
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SECTION A - PROJECT OVERVIEW

BACKGROUND

American businesses are learning the difficult high cost lesson of ignoring production and market factors (producibility, unit product cost (UPC), marketability, etc) during the engineering design phase of product development. Studies have shown that the Japanese spend three times as long as Americans in the design feasibility and decision process of new product introductions and one third the amount of time in the implementation of those products. There is a 20 to 1 cost benefit on effort applied in the design phase versus the production phase of the product life cycle.*

Producibility is defined as the conformance to manufacturing criteria and customer performance requirements. Basically, it means, "Can the product be produced, as designed, in the quantities required, at a cost that will generate enough demand to accomplish profitability objectives"?

Innovative Products Research & Services, Inc. (IPRS), as part of this project, has defined the process to be used during the early design stages by an inventor to assure that a product is developed in such a way that it can be marketed and produced competitively in a global environment.

This early stage design process includes the formation of liaisons with manufacturing engineering resources to provide both manufacturing and productivity inputs. In this way, a thorough validation of the design, manufacturing processes and parts will be completed prior to an attempt to produce and/or market the product in volume.

From the manufacturing perspective there are basically five phases of Product Maturity:

Concept and Definition
Advanced Development
Engineering Development
Advanced Production Engineering
Production

* Willis Willoughby (Quality Assurance Expert), Business Week, April 30, 1990 and J. Military Electronics, August 1980).

In this program we delineate how manufacturing resources will provide input into these phases of product maturity. Some of the factors we took into consideration during this process are:

Process development
Producibility of invention
Marketability of invention
Supply/demand rates at various cost levels
Automation of assembly and test processes
Facility space requirements at various production rates
Assembly and support equipment requirements
Production rate ramp up requirements
Make/buy decisions
Resource (vendors, labor, material, etc) availability
Tooling and test equipment requirements
UPC (Unit Product Cost)
LCC (Life Cycle Costing)

The success rate of products that make it to the production cycle will be greatly enhanced by the early introduction of producibility into the design process and by the advanced planning for new technologies and processes.

It is well known that many products fail not for lack of good design but for lack of acceptance by customers: failure to meet real market needs and/or wants. Therefore, we undertook to provide an early market evaluation of the product concept so that the inventor could make adjustments to his or her product design to be more responsive to the issues raised by prospective customers.

The market evaluation process was divided into four phases as outlined below.

Phase I - Preliminary Analysis
    Objective Analysis
    Subjective Analysis
Phase II - Concept Positioning Development
    Product Analysis Probes
    Positioning Copy
Phase III - Qualitative Concept Research
    Questionnaire Design
    Research Options
Phase IV - Concept Evaluation and Recommendations
    Objective Evaluation
    Subjective Evaluation
    Recommendations

The outputs of the marketing analysis are to provide Go/No-Go recommendations; to provide direction for positioning and/or improvements of the product; and, to identify key consumer needs and/or wants.

REPORT ORGANIZATION

This report is organized into four sections. This first section is an overview of the project. The second section is a report on experiences in setting up an organization. The third and fourth sections deal with marketing and manufacturing evaluation specifics respectively. Appendices are included on a section-by-section basis.

The marketing and manufacturing sections each include a tutorial on the evaluation process. Our experience in applying the process to four inventions is reviewed.

SUMMARY

The number one goal of this project was to establish an organization that has, as one of its purposes, the providing of services responsive to the needs of independent inventors. The number two goal was to demonstrate the value of providing marketing and manufacturing counsel at an early stage in the product development process.

The first study goal was met by providing the materials and information necessary to establish an evaluation team and an organization to handle such evaluations.

The second study goal was met by demonstrating the impact of early market analysis and manufacturing considerations on product design and therefore on the description of the invention for four different inventions. These inventions were selected at various stages of development. Regardless of stage of development, the marketing and manufacturing reviews resulted in significant changes in design and/or market positioning.

RECOMMENDATIONS

There are a number of possible follow-on activities that would be appropriate to accomplish the overall goal of assisting inventors in commercializing their inventions. Among the areas of weakness of independent inventors are the following:

ESTABLISHING MARKETING SUPPORT

Invention marketing is filled with major cost stumbling blocks. Many of them can be overcome by using the concept of sharing services. It is a well established practice within many large companies and contributes to their success. We believe that some models for sharing sales, marketing and distribution services among inventors and/or inventions need to be developed in the future. Some of the services which could be shared are:

- Market and Sales Managers
- Field Representatives
- Booths at Trade Show Exhibitions
- Distribution
  - Mail order catalog
  - Catalog Brokers
  - Retail Outlets - Invention Store

A few of these ideas have been tested such as the Invention Store and trade show participation; however, little has been done to document the value of such efforts to inventors.

OBTAINING DESIGN & MANUFACTURING SUPPORT

Responses could be to develop shared design and manufacturing services. The design services could be shared through development of software tailored to particular problems such as materials selection, design specification criteria, costing aids, etc. These might interface with various vendor's databases for prices, materials descriptions, etc.

Another response to the need for manufacturing support could be an alternative to the Thomas Register and other such listings of manufacturers and distributors. A list is needed which focuses on job shops which specialize in working with inventors on design issues and doing short runs for prototypes and marketing samples. Lists of plastic molders, sheet metal workers, foundries, electronics shops, et al. would be helpful. Sources of sample materials for use in prototypes would also be valuable.

Linkages with manufacturers and manufacturing engineers could be made through the Society of Manufacturing Engineers, which has chapters all over the world. This

connection has only recently been explored with the Inventors Association of New England (IANE).

Linkages with industrial designers and design services could be developed by having joint programs with the Industrial Designers Society of America (IDSA) which has chapters throughout the United States. A number of members of IANE are also members of IDSA. There needs to be more interaction.

OBTAINING EARLY STAGE FINANCING

There is an ongoing need for financing the early stages of invention development. We believe investors need a successful model that has been developed and demonstrated to serve as a point of reference and confidence.

One approach would be to develop an investor pool for evaluated inventions. Given the high return obtained from the DOE's investment in NIST-evaluated inventions, a case can be made for a relatively low risk, high-potential gain investment in selected inventions.

Whether one uses the NIST/DOE evaluation program, an IPRS evaluation, or others, the results should be favorable. The basis for the approach would be to demonstrate that investments based on shared royalties from licensing is inherently less risky than a comparable investment in establishing a new venture.

One source for members of the investor pool could be the Venture Capital Network that is now a part of the MIT Enterprise Forum in Cambridge, Massachusetts.

EXPLORING OTHER EVALUATION MODALITIES

Given the high cost and time involved in a panel evaluation, it is worth exploring the possibility of performing an early screen of inventions using an expert system. Unless the invention passed the review of the expert system, it could not go on to the more costly and time consuming evaluation by a panel of experts. One response could be to compare the evaluations given by a panel and those done by an expert system.

Some additional experience with selecting panel members would also be a fruitful area for further research. For example, what would be the difference in the results if a patent attorney or a financial professional were added to the panel?

IMPLEMENTING LICENSING PLANS & STRATEGIES

There are a series of stumbling blocks for inventors. First is in determining the appropriate strategy for a particular invention and/or inventor. Second is in obtaining funds to develop the invention to a licensable stage. Third is the creation and execution of a licensing plan. While a lot of information is available, it is not in a single place and not applicable to or usable by many inventors.

Clearly, the marketing and manufacturing input developed in the present study is a prerequisite for licensing. What are the other prerequisites? Can an IPRS-type panel serve to advise and guide an inventor through a successful licensing placement? How would the composition of the panel change? What would be the changes in activities, in resources required?

One should address questions such as "what are licensable inventions" and "who are licensable inventors?" We expect that answers to these questions could lead to a blueprint for a center that not only does early stage evaluations but can assist the inventor through the completion of licensing.

FINAL REPORT

SECTION B

EXPERIENCES SETTING UP AN INVENTOR SUPPORT CENTER

Prepared By

Innovative Products Research & Services, Inc.
Lexington, Massachusetts

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EXPERIENCES SETTING UP AN INVENTOR SUPPORT CENTER

BACKGROUND

Independent inventors and small business people are a source of new products, technology and information around which enterprises are formed. Such enterprises have historically fueled the economic growth of our country by creating well-paying jobs and have provided valuable goods and services. Despite the recognized value of the creative efforts of inventors, there is little formal support for such individuals. IPRS, an inventor support organization, was formed to study the new product commercialization process and to demonstrate the application of various direct support services to inventors. IPRS has provided expert counsel to inventors on ways to enhance the value of their inventions, to adapt them to market needs or wants and efficient manufacturing processes. The distinction between this center and other government and non-profit organizations is that IPRS emphasizes the licensing path to commercialization, rather than enterprise formation. It is our contention that the majority of inventors are better served by providing them licensing counsel rather than leading them toward in the riskier route of new venture creation.

The services delivered by IPRS are: 1) early stage market evaluation, to supplement U.S. Department of Energy (through NIST and NATAS) and other technical evaluation services; and 2) early design stage manufacturing engineering input to help assure that the products developed are ones that can be produced competitively in a global environment.

This document describes the process of establishing such a center and the process of obtaining a tax exempt status. We also include suggestions, based upon our practical experience, for others who might wish to do the same. Actual IPRS incorporation documents and IRS 1023 filing information is provided in Appendix B.

ORGANIZATION FORMATION

Form of Organization

We have determined that a support center should be incorporated as a charitable non-profit organization with a Federal IRS 501(C)(3) tax exemption. The reason is primarily financial - there are more sources of funding are available with this designation. Foundations both private and corporate require this designation as do some government agencies. Individuals are also more likely to donate support money if they can be assured of a tax deduction.

Legal Issues

The Internal Revenue Service (IRS) Code allows for research and education activities to qualify for a 501(C)(3) exemption. However, it does not allow for any commercial activities such as product testing, product engineering, prototyping, etc. A 501(c)(3) may be allowed to provide evaluation services if they are performed under certain guidelines providing it does not generate unreasonable revenues over costs and providing there is open access to the services. The regulations, and their current interpretations, create serious limitations to the activities of an invention support center that wishes to go beyond mere paper studies.

Most of the existing centers that provide non-profit invention support services do so in conjunction with either a government agency (as a Small Business Development Center) or as a university.

For colleges and universities it is relatively easy to tag on some "profitable" services because the "primary" service meets the tax exempt conditions of research and education. However, it is more difficult for a stand-alone organization, when there is possible royalty income involved (as fees for services).

Dealing with Lawyers: A Case Study

There are many problematic issues we had to address when applying for tax exempt status. For example, if we are to be advocates for inventors, would that be considered lobbying and therefore not allowable? If we provide evaluation and other services including publishing of results for a fee, could this be construed as profit-making activities? Could our providing invention development services be considered a commercialization activity which is not allowed under current regulations even though it does contribute to economic development which is allowed? We set out to find the most experienced lawyer in this area. We were referred by the licensing office of one of Harvard's hospitals to its lawyer in the firm of Ropes & Gray, a prestigious firm in Boston.

Initial interviews with Ms. Carolyn Osteen, a partner, were positive. She seemed to be very knowledgeable and competent. To answer some technical questions about

alternatives to forming both a for profit and non-profit, we were referred to a partner and associate in the same firm who seemed equally knowledgeable.

We provided Ms. Osteen with a draft of the Articles of Incorporation and Corporate Bylaws for a Massachusetts-based organization to review, edit and provide a finished draft. We also asked her to assist in preparing the filings for 501(c)(3) exempt status with the Internal Revenue Service.

Time passed. Ms. Osteen delegated most of the work to a less experienced associate. The initial draft came to us as materials for a Maryland, not Massachusetts corporation. This was subsequently corrected. They did not use our draft at all, but pulled up a standard form from their word processing files. Each time material was transmitted to us, we were charged for the partner's time, the inexperienced associate's time, and (we subsequently learned) the word processing department's time. The bill kept increasing and ultimately exceeded the initial estimate of $1500 to $2000. The law firm did file for the incorporation for us which was processed by the state without further complication.

The next stage was to prepare the application for IRS. After several iterations it became clear that they were not going to get the job done for anything less than $6000 to $8000. So, we retrieved the materials, dismissed their services and proceeded on our own to complete the application and respond to the IRS reviewer ourselves. We subsequently obtained our notification of exemption. The state filings were fairly straight-forward once the federal exemption was obtained.

We subsequently got a huge bill from the law firm. We negotiated it down to under $5,000 (the $800 word processing charge was dropped). We let it go into collection. After more than a year we were finally able to settle with the collection agency for $1700, the midpoint of the original quotation range.

In retrospect, we learned a number of lessons that are worth highlighting:

1. The biggest law firm is not necessarily the best one for you, even though their senior people may be very competent. Redundancy of effort at several levels, hefty overhead charges, and high hourly rates, are how large firms do business.

2. The bigger law firms are not geared towards the small client. They do not operate efficiently. They often do not respond quickly to a small client.

3. Law firms like to use their own forms and drafts. Find one that will work with you on yours.

4. Law firms often do not keep a running invoice. As a result you cannot monitor how much you have expended. You need to manage them. They will not manage your project for you.

5. Establish in written form what the costs will be and how you will proceed with them.

We recommend that you use the guide in Appendix B and do most of the work yourself. Bring a lawyer in only for review. It is also important to get a written commitment from him/her upfront on the cost and time guidelines. Furthermore, you need an agreement that the lawyer will work with you in the way you want them work with you.

Incorporation

We recommend incorporation as a non-profit organization so that you can obtain appropriate IRS recognition (501(c)(3) or similar exemption), which in turn enables you to raise funds more readily. In our case, incorporation was done in the Commonwealth of Massachusetts because that was the state of residence of the principals. While many for-profit organizations incorporate in the state of Delaware because of their advantageous corporate laws, there appeared to be no advantage for us to do so. If we had incorporated as a for-profit, so that we could engage more directly in invention development projects, incorporation in Delaware would have been given more serious consideration.

Considerations in going non-profit or for-profit include: the nature of the services you want to provide, the people you will serve, the accessibility of your services by the general public, and fund sources. If you expect to provide commercial services, then it may be difficult, if not unsuitable, to choose the non-profit route. You need to decide what level of commercial services you want to provide, how large your annual budget will be and how you will charge for your services. If your annual budget is under $5,000, minimal reporting is required. You need to check with your lawyer to determine how the laws in your state might affect your operations. Use the forms provided in the Appendix as a guide only. A lawyer experienced in one's home state should be consulted before drafts of Bylaws and Articles of Incorporation are filed.

Upon incorporation a Federal Identification number is obtained for tax purposes. This number will be used on all federal and state reporting forms.

IRS Exemption Filing

In our study, the application to the Internal Revenue Service (IRS) for the 501(c)(3) status was completed by working with a lawyer experienced in working with a major university (the basis for the referral). Filing was complicated in our test case by our desire to justify development activities under this status. However, after numerous discussions and drafts of the application (and escalating legal costs), we decided that development activities would be handled separately by a for-profit organization that would be funded from private sources. The complete IRS filing is provided in Appendix B.

State Exemption

Once you have received a Letter of Determination for exempt status from the IRS, you

can forward copies to your state requesting exemption from state taxes. Forms used in the Commonwealth of Massachusetts are included in the Appendix.

State Registration as a Public Charity

In addition to filing with the state revenue department requesting the exempt status, a separate filing with the state Attorney General's office is required in Massachusetts if you are to solicit funds from the public and receive amounts over $5,000. This Solicitation Certificate from the Attorney General's Office costs an additional $10 over the standard Annual Report filing which costs $25.

Forms used in the Commonwealth of Massachusetts are included in the Appendix.

Reporting Requirements

There are a number of reports you may need to file on a regular basis with the state and federal government. If you employ people, you need to file form 941 as an employer accounting for withholdings from employee paychecks. These filings are done on a quarterly basis and need to be filed whether you have any employees during that quarter or not.

Within three and a half months after the end of the calendar or fiscal year, you need to file (with the appropriate center for handling non-profits) Form 990 - Return of Organization Exempt from Tax with the appropriate center handling non-profits. This filing should follow your annual meeting at which all accounting records are reviewed and approved.

At the state level, an Annual Report listing time of the annual meeting, the officers, their addresses, directors and expiration date of terms of office is required by the Secretary of State.

Also annually, all non-profit corporations must file FORM PC -- Annual Report along with a filing fee of $25.00. This form is usually accompanied by a copy of your federal Form 990 or 990EZ. This is filed with the division of Public Charities in the Attorney General's Office. An application for a Solicitation Certificate may be sent at the same time along with an additional $10.

It will be important to check out the reporting requirements in your state of operation. Check with the offices of the Attorney General and Secretary of State.

ORGANIZATION DEVELOPMENT

Fund Raising

To attract the support of major corporations and wealthy donors, there are minimal requirements that must be met. Most donors want the benefit of a tax deduction, which means you need to be incorporated and have your tax exempt status allowed by the IRS. Furthermore, most donors want to see specific programs outlined before they will provide support. We chose to go through the following steps before going for outside support.

Incorporation
Tax exempt allowance
Program identification
Presentation materials

Other organizations may require seed funding to pay for expenses incurred to get through the foregoing stages of forming the organization and identifying programs. The expenses of the formation of the organization stage are mostly legal, secretarial and printing. The tasks to be performed are the preparation of Articles of Incorporation and Bylaws and filing for tax exempt status with the IRS and your state.

In our case, the cost to this point, if the work had not been done by volunteers, would have been in excess of $5,000. As it was, we had only legal expenses ($2,000) and printing costs ($200).

Although we would not discourage others from seeking donations from interested private individuals in the formative stage of the organization, our experience was that people outside of the founding group were not willing to risk their money on something so tenuous. Our funds for this stage came from the founding board of directors who volunteered their time and money.

The second stage of formation and fund raising is your program identification and the development of presentation materials. The tasks include: drafting details of programs to be undertaken; developing support materials such as flyers that explain the organization; develop a theme or byline and logo to be used on stationery; print stationery; and develop a presentation booklet for use in personal recruiting of advisory board members, financial supporters, and other interested parties.

Again, because we had a dedicated and talented board of directors, these tasks were all done on a volunteer basis and the expenses were borne by board members. The estimated value of these contributions is well over $8,000. Our actual out-of-pocket expenses were under $250. Samples of the flyer, presentation book inserts and solicitation flyer are included in Appendix A.

At the third stage of organization and fund raising you have your programs well in mind, materials to support a professional presentation and personnel in place to deliver on a

particular proposed program, and potential supporters identified.

We approached a number of influential individuals with our package asking for financial support and/or network referrals. In some instances the feedback received was that our objectives were great but there was no clear linkage between those objectives and program specifics. We went "back to the drawing board" to get more focussed and to target our donor audience.

The program identification step needs to be very specific and needs to have a tangible output. The proposed results of a program needs to be realistically obtainable with the resources allocated. Examples of programs we proposed were:

1) A newsletter to be distributed free of charge to leaders in business, government and education. The newsletter would highlight issues related to invention and economic development.

2) An information resource center which would serve as a repository of articles and statistics on the role of invention in society. The resource center would provide information for speeches and policy drafts by local and national leaders and lawmakers.

The presentation materials should provide in a very concise way the statement of the problem and how your organization will contribute to the solution. It should be explicit in outlining the amounts and type of support being requested. It should also convey an openness to other people's creative responses (such as for doing volunteer work).

Funding Sources. Following are some funding sources, annotated for your information.

* Private individuals
  Usually the fastest response but only limited amounts of money.
  Strong personal persuasion required.

* Foundations
  Approach must be very targeted. See the Directory of Foundations from New York for listings of restrictions and preferences.
  May take up to 1 year from initial approach to receipt of funds.

* Corporate Foundations
  Best approached if an employee is already involved in your organization.
  Often are limited to those areas where a facility is located.
  May take up to 1 year - less if an employee recommends.

* Corporate Gift-giving Departments
  Grants usually under $5,000.
  Accessed mostly through an employee of the company.
  May provide meeting space if an employee is involved.

* University
  Approach through department heads.
  Generally have no money but may provide space for meetings or projects.

* State and Federal Agencies
  Try Economic Development agencies. May provide some administrative support (as for mailings).

  The small business development centers (SBDC) have no money to give but can provide free to low cost counsel and/or arrange for space on campus.

  It is likely to require more than a year to obtain funds from agencies. For large amounts, it will require at least one legislative session and/or fiscal year.

* Trade Associations
  Trade associations may offer limited funds and/or administrative support such as access to mailing lists of members and low cost space at trade shows.

IPRS has explored most of the above sources for funding and support. The trade association AIM (Associated Industries of Massachusetts) was supportive as was SBANE (Smaller Business Association of New England) for support. Labor unions were not pursued beyond an initial contact.

A copy of the Investor/Supporter Presentation Booklet is provided in the Appendix. This was used by board members when making personal contacts with people we approached for their support. The initial draft was too long and too wordy. It required over 30 minutes to present which was too long for most people. After a number of revisions it was reduced to the number of pages shown.

Selection of Board of Directors and Advisory Board

The careful selection of officers, boards of directors and Advisory Board prevents many future problems. A flip chart presentation booklet (referred to above as the Investor/ Supporter Presentation Booklet) was designed to provide an introduction to the purpose, goals, and programs of IPRS. This was one of the tools used in soliciting participation

by board members. Roles we identified for board members were to:

* Provide guidance in determining strategies and priorities
* Assist in obtaining needed human and financial resources
* Attend semi-annual board meetings.

One of the roles of advisory board members is to provide personal contact with sources of funding. This and other roles are spelled out in our presentation/solicitation document as below:

* Provide leadership to industry, academia and government with respect to U.S. competitiveness

* Provide wise counsel

* Provide contacts to sources of information

* Provide contact to sources of financial support

* Provide access to other resources (personnel, equipment, facilities, etc.)

* Be an advocate for programs and policies that will contribute to the success of U.S. manufacturers and inventors approaching these manufacturers.

Our experience in enrolling board members was that, if you hope to get very busy and very influential people involved, you have to have a very clear statement of objectives and a very clear and focussed plan as to how those objectives can be met in a realistic time-frame and for realistic funding levels.

Facilities

In our case, organization meetings with the board of directors and advisors (four people) were usually held at a local restaurant. When the group was expanded to include the evaluation team, we sought a larger meeting place. We met in a variety of locations throughout the year including a local restaurant, a local university (MIT), and one of the team member's conference room. The latter proved to work best as there were minimal interruptions, parking was available and refreshments were conveniently provided.

To conduct confidential discussions a private area is best. It should allow the team to spread out materials submitted by the inventor and/or by the team members. For brainstorming sessions it is important to have a blackboard or flip chart available for recording the ideas in a way that all can see. An overhead projector with blank transparency material and special pens also works well.

Meeting space in university or corporate offices can often be obtained without cost to the organization, especially if the meetings are at off-peak hours for the facility.

Finances

All of the initial costs for forming and developing programs of IPRS were borne by directors and officers of IPRS. Counsel was often provided on a volunteer basis through regular weekly meetings. Expenditures were kept modest so that the level of activity could be sustained over a long period of time (over two years).

Besides legal costs, the biggest expenses were printing, mailing, telephone and other general office expenses. These costs were donated by the principals and/or their employers. The lesson to be learned is that it pays to have board members who have offices and office equipment that can be used.

IPRS expects to solicit funds from foundations to defray general overhead costs as well as for specific program implementation. A number of foundations which support economic development programs have been identified through the Directory of Foundations, available at most public libraries.

PROGRAMS

IPRS has identified a number of programs which fall within its charter of fostering the commercialization of inventions and innovations. Two were mentioned above and others appear in the form of recommendations in Section A. Organizations which might support such programs have been identified. However, because of limited staff time and lack of revenues to retain assistance, we have not presented formal proposals to these groups.

The principal program undertaken by IPRS since its inception is that defined in the present DOE ERIP grant; namely, to perform marketing and manufacturing evaluations in the early stages of product development. In order to perform these services we had to build a team; develop a process for screening submissions; and develop criteria for selecting the inventions into the program. These activities are detailed below.

Team Selection

Selection of personnel to serve on the review team was based upon personal contacts. We drew upon professional groups such as Society of Manufacturing Engineers (SME), American Marketing Association (AMA), and Inventors Association of New England (IANE) for manufacturing and marketing and invention experience respectively.

We decided we would focus on products that could be used by consumers (and possibly others). This focus was selected because: we had an expert in consumer marketing on the team; we thought that the whole team could relate to the products better; and, we could serve a greater variety of inventors without our having to have a larger team, each with specialized industry experience. After reflecting on our experience, all of us agreed that the success of the effort depends upon having an appropriate mix of business, marketing, manufacturing and technical evaluators to provide a balanced view.

Screening/Evaluation of Inventors/Inventions

The criteria for selecting inventors/inventions into the program were somewhat more rigorous than conventional screening and evaluation procedures which emphasize the invention rather than the inventor. We wanted to have interaction with the inventor and wanted the inventor to be in a position to respond to the input provided by the team of experts. These and other criteria were included in a program description document that was part of the inventor application form included in Appendix B.

If the inventor accepted the terms of the application, we interpreted this to be an indication of the inventor's seriousness about his/her invention and his/her willingness to cooperate in the program.

Because of the extensive networks of the IPRS team (including access to more than 200 members of the Inventors Association of New England) finding three to four products with compatible technologies and/or markets was not a problem. It was important to find compatible products so that the expertise of our team could be best used and so the services could be delivered economically. Other clusters of common technologies and

markets would not change the composition of the team appreciably because the team had a multi-disciplinary background. A less diverse team probably should bring in outside expertise for particular clusters.

Other screening criteria were developed by the marketing and manufacturing teams as the study progressed. These are reported in Sections C and D.

One selection criterion was that the inventor affirm that he or she had sufficient financial and technical resources to respond to team inputs. For example, if the IPRS team suggested a change in design to meet a consumer need, the inventor would have to be able to make such a change in a relatively short period of time. In looking back, we can see this was the one criterion most often compromised in the selection process and the one which caused the most problems since the inventor had no resources to carry out the IPRS team directive. There needs to be either tighter screening in this regard; or there needs to be additional resources available to the inventor, such as through an investor linkage service.

Handling of Confidential Materials

One of the concerns of inventors was that if they were to be completely open before a panel of experts, they wanted assurance of confidentiality. One of the concerns of the experts on our panels was that if the ideas presented were similar to ones that they had worked on personally or for clients, they did not want to be accused of stealing the inventors ideas when in fact those ideas were already under development elsewhere. The concerns of our panelists were met by accepting only ideas which had been well defined as to specific embodiment. The one exception was where the submitter had a well-defined concept as to market application but did not have an invention yet. In this case, consultants/panelists waived any rights to the invention that might come out of our discussions.

The concerns of the inventor were met by having all reviewers sign confidentiality agreements. Additional precautions were to mark all materials as confidential and maintain records in safe places. Reports outside the group were "sanitized" to hide the proprietary aspects of the inventions. Some compromise was made with the inventors in being able to reveal the basic purpose of the invention without revealing the way in which that purpose was accomplished. Many inventors would prefer to not reveal the purpose of the invention; but, those participating in the present study had to be flexible in this regard. In fact having this flexibility was one of the unstated selection criteria because IPRS could not doits work without this information.

As a matter of principle, even among the team members, only those with a "Need to Know" were given all of the information available. This was a judgment call on the part of the Principal Investigator.

Process Control and Forms

It was helpful to develop an agenda for each meeting of the team. It made it easier to reach agreement on what tasks remained to be done and who would be responsible for getting them done. A report on each meeting was also written and distributed to team members. This report assured that team members absent from a particular meeting were kept informed and also served as a reminder of the reasons for certain tasks to be performed.

A number of forms were developed to expedite and focus the review process. Copies of the Application Form, Confidentiality Agreement, and Project Review Form are shown in Appendix B.

APPLICATION OF PROCEDURES & RESULTS

IPRS has piloted a shared services primary market research effort on product concepts/inventions which have passed technical feasibility and novelty evaluations. Prospective end users were approached for feedback on design, application, and purchase intent. The details of the procedures are in the Marketing Services Section C. The specific feedback of consumers on particular products is confidential information. However, we have provided general comments below which will illustrate the process.

IPRS also piloted a shared services manufacturing/design evaluation where inventions, which have passed technical feasibility, novelty, and market evaluations, were presented to a team of experienced manufacturing people for feedback on design, manufacturing processes and production costs. Because of the confidential nature of the products reviewed, specific feedback of the manufacturing team is not included in this report; but, as with the marketing analysis, a number of general comments can be made and lessons learned are shared. Details of the manufacturing/design review process are provided in Section D.

All the products reviewed had potential in consumer markets. It was also determined that working prototypes could be produced for relatively low cost. Other than these criteria, the products were rather diverse in stage of development and anticipated niches (see figure on the following page). The inventors accepted for review are identified as RT, DJ, SE, and EJ.

RT's Product. The product of inventor RT had to do with making recycling easier for the homeowner. The product combines certain electromechanical functions with containerization. The marketing assessment was that the consumer currently has many options but each town/area handles recycling differently; therefore there is no single large market. It was the judgment of the marketing team that, while consumers would be interested, there was not enough consistency in demand yet to finalize product design and attributes. The size and price of the device were also concerns.

The manufacturing evaluation team felt that the design of RT's product was too complex for the product to be manufactured at a reasonable price. High cost means high selling price which means lower market demand which means a long pay-out on investment in tooling and set-up costs. It also means materials will cost more. The inventor was therefore encouraged to pursue his second design which would simplify the mechanics and lower the cost of the device. RT was provided with detailed forms to assist him in preparing components lists, pricing, and preferred order and method of assembly. Samples of these forms appear in the appendix to Section D.

A close integration of marketing and manufacturing considerations was deemed critical because flexibility of design was important in order to address many market segments.

CHARACTERISTICS OF PRODUCTS REVIEWED

Status as of 9/20/91

Stage\Characteristic	Inventor/Invention RT	DJ	SE	EJ
Concept	x	x	x	x
Patent Search	x	x	x	x
Patent Filed	yes	draft		
Design Options Identified	x	x	Matrix	List
Working Prototype 1	x	x	5/22	
Revised Prototype 2+				
Market Concept Test	x	x	x	OEM
Market Test Prototype Revision		x		
Licensee Pending				OEM
Licensing Plan	draft			
Business Plan		Outline	Yes	N/A
Manufacturing Initial Run		5/30		
Production Scale-up				
Market Niches				
Consumer	x	x	x	Indirect
OEM			?	Yes
Commercial		x	x	
Industrial		x	x	
Government		x	x	
Other				

Yet, one needs to have commonality between the manufactured components to gain efficiency in production. Without an efficient manufacturing operation it will not be possible to keep costs down and to broaden the market demand (to middle income families).

DJ's Product. This product has both commercial and consumer applications in reducing costs for maintaining the cleanliness of bathroom sinks. The inventor presented several designs to the team along with samples of competitive products. Initial market testing suggested that the product definitely was of interest but many users wanted the device to have an adjustable feature. This was not in the orginal plan of the inventor and meant significant design changes and potential increase in molds and production costs. Nonetheless the inventor went back to the drawing board to develop a design with an adjustable feature. Several months lapsed before a working version was produced.

Since the product was potentially injection molded, most of the interaction concerning manufacturing was with Mr. Herbert Brown, the team specialist in manufacturing plastics. A number of design changes were suggested, which would lower the cost of molding and producing the product. For example, he suggested a change to two simple components rather than a single component that would have required a complex mold with multiple side actions (to produce holes around the circumference of a cylinder. By going to two parts, the "holes" could be slots on one piece and a smooth surface on the facing piece. A mechanism for fastening the two pieces together had to be developed but this was readily accomplished through joint discussions with inventor and manufacturer Brown.

Another change directed by manufacturing considerations was to go to a fluted cylinder rather than a solid one. By spacing the flutes, one could get the desired appearance of a large diameter while still keeping wall thicknesses in any part of the component to less than a quarter of an inch. The inventor was informed that if wall thickness are greater than this, there can be distortions or imperfections in the resulting piece. The inventor agreed to the suggested change.

Two samples of early designs were provided to team members for personal testing. One did not understand how to install it, suggesting the need for explicit instructions to be included in sales literature when produced.

Mr. Brown has continued to work with DJ to provide improvements on a machined prototype prior to commiting to making a mold. Estimated costs for making the mold are from $2000 to $3500. The inventor wanted to do some further testing to optimize the device performance before proceeding with the expense of the mold. As of September 1991, the optimization is nearly complete and a commitment to make molds for initial production of samples was close at hand. These samples are deemed important for the next phase of market evaluation.

Based upon the feedback of the IPRS team, the inventor will be filing a rather different patent application than would have been filed without this feedback. The feedback has contributed directly to at least one additional independent claim (for the adjustable feature) and two dependent claims (for the two-component part and for the fluted surface).

SE's Product. SE's invention had not been prototyped despite considerable design work. The invention is a novel connection system that can be adapted for many applications ranging from consumer toys to architectural structures. It offers a number of advantages over the conventional hub and strut systems. Initial discussions revealed a strong protective mentality combined with a philanthropic bent and a rather naive business sense.

The inventor's strong philanthropic bent is to meet the needs for temporary and permanent shelter in lesser-developed countries through adapting his system to maximize use of locally produced materials. He is also caught up with the importance of keeping product designs mathematically simple (integral numbers of basic building units) and the aesthetic lines pure (no abrupt transition points).

SE was initially constrained in his progress by lack of money and a shop equipment. Once shop space and equipment was secured, other factors became limiting such as materials costs. Outside of grant time, Principal Investigator Dr. Donald Job worked with SE to develop some plans and ended up doing some design work and building some prototypes in his own shop. These efforts resulted in sufficient specifications for the team. However we were still left with the problem of identifying a suitable market niche to focus on. SE could provide a list of dozens of potential applications but would not provide a rank order of importance. He wanted to do them all. Manufacturing could not go ahead without specific applications and designs. Marketing could not test dozens of concepts (with the limited time and money we had allotted per invention). This prompted some interesting questions about our role as evaluators/designers/marketing consultants. The solution proposed was to have the marketing team meet again with SE to try to get him to select a single market/product that would benefit from his system and that we could provide assistance with as a team.

Team member Mr. Ed Jeghelian and Dr. Donald Job met with SE and an associate of his. The agenda was to select a single market and product for that market which SE could support with prototypes and the IPRS team could manage. After considerable discussion, it was decided that building a portable house for pets was an application that was testable, would serve as a model for larger structures, and could produce some near-term income which would provide for additional development of the larger housing products.

The results of the market research (See details in Section C) were that there was some consumer interest and some suggestions made for further development. Over two months have passed and SE has not developed the prototype recommended. His level of commitment to our recommended approach is obviously not high.

The IPRS team concluded that some inventors will never adopt the pragmatic mentality (build something mundane to make your money so you can then do what you really want to do). It may be a disservice to them to try to persuade them that they must follow such a plan. Rather, it may be better to encourage them in their esoteric and philanthropic pursuits by suggesting they apply for money from government agencies or foundations which have a charter for "doing good". This is not to say that the inventor will be more likely to raise money in this fashion than through commercial sources. Foundations and government agencies also tend to be pragmatic and are not generally interested in funding vaguely defined programs. The creative person who is unable to express his ideas in concrete terms

and who is unable to provide a realistic assessment of costs and potential returns is at a serious disadvantage in both the for profit and non-profit sectors. Therefore, one of the selection criteria for determining who one supports in a program such as this should be not only the idea's merit; but the inventor's understanding of how things get done in the real world. Is he or she willing to do whatever it takes even though it may mean "compromising his creation?"

Some possible questions to ask to make this determination might be:

What are your goals for your invention?
What has been your job experience?
What forms of your invention are acceptable to you?
What are you willing to do to help make it happen?
How much money do you think it will take to develop your invention?
How much money do you think can be made by someone else developing your invention?
How many people will be helped by developing your invention? What are the steps you feel need to be taken to make this happen?
What steps have you taken to develop a working prototype?

Based on the answers given to the foregoing questions, one should be able to distinguish between the serious vs non-serious inventors; the global (my invention is going to solve the world's problem of ...) vs. the practical and flexible inventor.

EJ's Product. EJ's invention was at the concept level only. The general market need had been identified by EJ through industry contacts. The expressed need was for an alternative to aerosol spray applicators for hair and body care products. One reason for selecting this "invention" was because of the assurances that it would be licensed by a major consumer products company if an acceptable alternative could be developed. In other words, the market niche would be created for the product.

The IPRS team recommended a brainstorming/focus group session to "invent" the product. Working with Ed Jeghelian, Don Job selected some technical and creative experts to participate in a special session. We developed additional forms that each of the particpants signed that waived their rights of ownership in any ideas which came out of the session in exchange for a payment of $25 and the price of their dinner. The session was held over dinner at a local restaurant.

The brainstorming session participants were Ed Jeghelian, Don Job, a mechanical engineer, a chemical engineer, a toy designer and a female consumer. Marketing background information was provided by Ed Jeghelian and Don Job provided some technical background on current options in use. A number of good ideas were developed in the two hour session for follow-up by EJ and his technical associates. Jeghelian indicated he would try to obtain further definition of the need as perceived by consumers and industry. To date no prototypes have been developed. A manufacturing review will occur after some specific designs are proposed.

General Comments. One of the lessons learned was that the interaction with the inventor is probably more important that the merits of the invention itself. If we had to identify a weakness in the process it would likely be that several of the participants, including the principal investigator, were tempted to get caught up in the invention and discount the role of the inventor in bringing it to fruition. There is also the opposite trap of being persuaded by the personality of the inventor and overlooking pitfalls in the invention or its design. Either extreme can be a cause of failure. Any group attempting to replicate the IPRS experience should be alert to this happening.

One of the ways to protect against pitfalls in judgment is through having teams within the larger panel. Marketing and manufacturing teams operated somewhat independently and then came together to report their results to the whole panel. This process of independent study by sub-groups which then report to the whole group tended to minimize potential snowball or railroading effects. The presence of marketing, design and manufacturing people on the panel who are not active on either the marketing or manufacturing teams, served to provide further balance to the effort. It may make for a larger than necessary effort; but, on balance, served us well.

The integration of the marketing and manufacturing/design teams with the whole panel went well. It was especially valuable to have at least two members on each subgroup team. Besides broadening the perspective, it meant that if one was not available, the other was.

The one complaint of team members was that there were too many general meetings. We usually met at least once a month. If we were to merely provide the evaluation services, we would not have needed to have as large a team. Neither would we have spent as many hours in discussing the process. However, for the purposes of articulating and documenting the process, it worked very well and would have been difficult to accomplish with fewer face-to-face group meetings.

The minutes of the meeting were rather detailed and were probably a sufficient means of keeping the team members informed and providing documentation for future study and analysis.

The Product Report form was an effective but underutilized mechanism for communicating results to the entire team. It was used as one means of reporting results back to the inventor.

FUTURE OF IPRS INVENTOR SUPPORT PROGRAM

We hope that IPRS can obtain additional funding for the Inventor Support Program initiated under the DOE grant. We will appeal to various foundations and individual donors to sponsor the review of additional inventions/inventors. We will also ask the inventors themselves to help defray the costs of the service. The cost for the services performed in the present study is calculated below to be $4,196. We estimate that this amount could be reduced to as low as $2,000 without compromising the level of service. This represents a potential savings to the inventor of at least 50-75% compared to the cost of individually obtaining marketing and manufacturing/design services.

Costs to Deliver Services

Reduced rates of consultants were obtained for the purposes of this grant. The hourly rates were 30% to 75% of the going commercial rate. The data presented below are based upon these reduced rates. If you do not have access to philanthropically minded consultants, you will need to increase the costs accordingly. Cost estimates are based upon the time involved times the hourly rates of each team member involved.

In our experience the time to handle each of the four inventions was as follows:

Inventor Submissions
15 minutes professional time for intial screen per application
Select about 25% for follow-up.
Time: 4 hours @ $60 each
15 minutes administration time.
Time: 4 hours @ $20 each
Cost to get 4 inventions: $320 or $80 each

Inventor Interview - 1.5 hour (9 person hours @ $60 each)
Cost for 4 inventions: $2,160 or $540 each

Team Discussion - 1 hour x 6 (6 person hours @ $60 each)
Cost for 4 inventions: $1,440 or $360 each

Verbal recommendations, request for additional information
15 minutes professional
15 minutes administration
Cost for 4 inventions: $ 80 or $ 20 each

Inventor Response - filling out cost estimating and other forms

Follow-up with Recommendations & Report
Manufacturing - 3 hours (6 person hours)
Marketing - 3 hours (6 person hours) plus $300 expenses
Administration - 2 hours
Cost for 4 inventions: $3,340 or $835 each

Inventor Response - New prototype/design

Retest in Market
Marketing - 3 hours (6 person hours) plus $300 expenses
Team Review & Recommendations - 1 hour (6 person hours)
Cost for 4 inventions: $4,084 or $1021 each

General Administrative costs - 5 hours per invention plus $400 Expenses
Cost for 4 inventions: $ 800 or $200 each

Program Management - 16 hours per invention plus $200 expenses each
Cost for 4 inventions: $4,640 or $1160 each

TOTAL COST PER INVENTION: $4,196

Clearly, the costs add up quickly when you involve a number of professional people in the review process. This raises a number of questions. Would the inventor perceive the value to be commensurate with the costs? How many inventors would be able to afford such services? How many would be willing to pay for such service? Are there less expensive ways of provide a similar level of service? Are there sources of money which would underwrite such costs on an on-going basis? What would be the benefit to them? Will the return on this investment be sufficient to justify the expenditure? What will be the increased chances of success of an inventor who uses these services? The answers to these questions remain for another study to address.

We conclude that the panel approach to reviewing inventions is effective in providing valuable feedback to inventors. Whether this approach is more or less effective than other models cannot be determined. We suspect that variations of checklists as in Udell's model and that used at the University of Wisconsin idea evaluation center do not provide the depth of analysis and amount of specific feedback which can be obtained from a panel of experts. We also expect that having a panel of six or more members enables one to provide more feedback to the inventor than a "panel" of one or two as used in evaluations provided by Affiliated Inventors Foundation. However these other services charge only $150 to $200.

We expect that there is a place for different types of services. What the place is of the larger panel of experts as used in this study remains to be seen. If the process can be streamlined so that costs are reduced and/or funding mechanisms are developed, then the role of the multi-disciplinary invention review panel could be expanded to meet the needs of thousands of inventors across the country.

SUMMARY

Our primary objective was to demonstrate the feasibility and advisability of providing marketing and manufacturing feedback to the inventor at the earliest stages of development of the concept. We have shown that the details of all inventions change as they go through various evaluations. The changes introduced at the earliest design stages lead to significant cost savings in preparation of the patent and substantially improved claims for patent filings; lead to reduction of "re-works" in early manufacturing processes; reduce the overall commercialization time and ultimately yield greater acceptance in the marketplace.

Our secondary objective was to document the IPRS program in such a way that we could provide others the necessary information on how the programs piloted by IPRS can be established in other parts of the country to serve inventors and small business innovators in each region. This document fulfills that objective. The IPRS staff is available to work with the Department of Energy to produce this information in booklet form that can be reproduced for distribution to Regional Support Offices and elsewhere.

APPENDIX - B

APPENDIX - B

Letter of Determination

Federal Tax Exempt 1023 Application

- Narrative
- Financial Projections
- Samples of Correspondence & Endorsements
- Application for Employer Identification Number
- Advisory Board Correspondence and Certificate
- Articles of Incorporation
- Corporate Bylaws

State Application for Exemption

Charitable Fund Raiser Application

Solicitation Booklet & Narrative

Forms and Flyers Developed

- Development Program Description & Inventor Application
- Consulting Agreements with Confidentiality
- Inventor Product Report Form
- Acknowledgment of Contribution Form
- Solicitation Flyer
- General Flyer

FEDERAL TAX EXEMPT 1023 APPLICATION

ARTICLES OF INCORPORATION

CORPORATE BYLAWS

STATE EXEMPTION

CHARITABLE FUND RAISER APPLICATION

SOLICITATION BOOKLET & NARRATIVE

FORMS & FLYERS DEVELOPED

APPENDIX - B

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Solicitation Booklet & Narrative

Forms and Flyers Developed

- Development Program Description & Inventor Application
- Consulting Agreements with Confidentiality
- Inventor Product Report Form
- Acknowledgment of Contribution Form
- Solicitation Flyer
- General Flyer

IRS LETTER OF DETERMINATION

Internal Revenue Service

Department of the Treasury

District
Director

P.O. Box 1680, GPO Brooklyn, N.Y. 11202

JUL 24 1989

Date:

Innovative Product Research and
Services, Inc.
P.O. Box 335
Lexington, MA 02173

Employer Identification Number:
22-2938424
Accounting Period Ending:
December 31st
Foundation Status Classification:
509(a)(1)
Advance Ruling Period Ends:
December 31, 1992
Person to Contact:
Mr. J. May
Contact Telephone Number:
(212) 264-7258

Dear Taxpayer:

Based on information supplied, and assuming your operations will be as stated in your application for recognition of exemption, we have determined you are exempt from Federal income tax under section 501(c)(3) of the Internal Revenue Code.

Because you are a newly created organization, we are not now making a final determination of your foundation status under section 509(a) of the Code. However, we have determined that you can reasonably be expected to be a publicly supported organization described in section(s) 509(a)(1) & 170(b)(1)(A)(vi).

Accordingly, you will be treated as a publicly supported organization, and not as a private foundation, during an advance ruling period. This advance ruling period begins on the date of your inception and ends on the date shown above.

Within 90 days after the end of your advance ruling period, you must submit to us information needed to determine whether you have met the requirements of the applicable support test during the advance ruling period. If you establish that you have been a publicly supported organization, you will be classified as a section 509(a)(1) or 509(a)(2) organization as long as you continue to meet the requirements of the applicable support test. If you do not meet the public support requirements during the advance ruling period, you will be classified as a private foundation for further periods. Also, if you are classified as a private foundation, you will be treated as a private foundation from the date of your inception for purposes of sections 507(d) and 4940.

Grantors and donors may rely on the determination that you are not a private foundation until 90 days after the end of your advance ruling period. If you submit the required information within 90 days, grantors and donors may continue to rely on the advance determination until the Service makes a final determination of your foundation status. However, if notice that you will no longer be treated as a section 170(b)(1)(A)(vi) organization is published in the Internal Revenue Bulletin, grantors and donors may not rely on this determination after the date of such publication. Also, a grantor or donor may not rely on this determination if he or she was in part responsible for, or was aware of, the act or failure to act that resulted in your loss of section 170(b)(1)(A)(vi) status, or acquired knowledge that the Internal Revenue Service has given notice that you would be removed from classification as a section 170(b)(1)(A)(vi) organization.

If your sources of support, or your purposes, character, or method of operation change, please let us know so we can consider the effect of the change on your exempt status and foundation status. Also, you should inform us of all changes in your name or address.

Beginning January 1, 1984, unless specifically excepted, you must pay taxes under the Federal Insurance Contributions Act (social security taxes) for each employee who is paid $100 or more in a calendar year. You are not liable for the tax imposed under the Federal Unemployment Tax Act (FUTA).

Organizations that are not private foundations are not subject to the excise taxes under Chapter 42 of the Code. However, you are not automatically exempt from other Federal excise taxes. If you have any questions about excise, employment, or other Federal taxes, please let us know.

Donors may deduct contributions to you as provided in section 170 of the Code. Bequests, legacies, devises, transfers, or gifts to you or for your use are deductible for Federal estate and gift tax purposes if they meet the applicable provisions of sections 2055, 2106, and 2522 of the Code.

You are required to file Form 990, Return of Organization Exempt from Income Tax, only if your gross receipts each year are normally more than $10,000*, or $25,000 for years ended on or after December 31, 1982. If a return is required, it must be filed by the 15th day of the fifth month after the end of your annual accounting period. The law imposes a penalty of $10 a day, up to a maximum of $5,000, when a return is filed late, unless there is reasonable cause for the delay.

You are not required to file Federal income tax returns unless you are subject to the tax on unrelated business income under section 511 of the Code. If you are subject to this tax, you must file an income tax return on Form 990-T. In this letter, we are not determining whether any of your present or proposed activities are unrelated trade or business as defined in section 513 of the Code.

You need an employer identification number even if you have no employees. If an employer identification number was not entered on your application, a number will be assigned to you and you will be advised of it. Please use that number on all returns you file and in all correspondence with the Internal Revenue Service.

Because this letter could help resolve any questions about your exempt status and foundation status, you should keep it in your permanent records.

If you have any questions, please contact the person whose name and telephone number are shown in the heading of this letter.

Sincerely yours,

District Director

cc:

Enclosure: Form 872-C.

Your tax-exempt status is predicated on the understanding that the results of any research grants made for scientific purposes will be made available to the public on a non-discriminatory basis.

* For tax years ending on and after December 31, 1982, organizations whose gross receipts are not normally more than $25,000 are excused from filing Form 990. For guidance in determining if your gross receipts are "normally" not more than the $25,000 limit, see the instructions for the Form 990.

Form **872-C**
(Rev. March 1986)

Department of the Treasury—Internal Revenue Service

Consent Fixing Period of Limitation Upon Assessment of Tax Under Section 4940 of the Internal Revenue Code

(See Form 1023 instructions for Part IV, line 3.)

OMB No 1545 0056
Expires 3 31 89

To be used with Form 1023. Submit in duplicate.

Under section 6501(c)(4) of the Internal Revenue Code, and as part of a request filed with Form 1023 that the organization named below be treated as a publicly supported organization under section 170(b)(1)(A)(vi) or section 509(a)(2) during an advance ruling period,

Innovative Products Research and Services, Inc.
(Exact legal name of organization)

P.O. Box 335
Lexington, MA 02173
(Number, street, city or town, state, and ZIP code)

} and the District Director of Internal Revenue

Consent and agree that the period for assessing tax (imposed under section 4940 of the Code) for any of the 5 tax years in the advance ruling period will extend 8 years, 4 months, and 15 days beyond the end of the first tax year.

However, if a notice of deficiency in tax for any of these years is sent to the organization before the period expires then the time for making an assessment will be further extended by the number of days the assessment is prohibited, plus 60 days.

Ending date of first tax year December 31, 1988

Name of organization	Date
Innovative Products Research and Services, Inc.	11/16/88

Officer or trustee having authority to sign

Signature ▶ [signature] President

District Director [signature] Date [illegible]

By ▶ [signature]

For Paperwork Reduction Act Notice, see page 1 of the Form 1023 instructions.

FEDERAL TAX EXEMPT 1023 APPLICATION

IPRS Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173
(617) 862-5008

November 17, 1988

Internal Revenue Service
EP/Exempt Organization Division
P.O. Box C-9050 GPO
Brooklyn, NY 11202

Dear Sir or Madam:

Enclosed is the application of Innovative Products Research & Services (IPRS) for Recognition of Exemption under Section 501(c)(3) of the Internal Revenue Code. We incorporated as a non-profit organization in the Commonwealth of Massachusetts, August 11th of this year.

I believe the enclosed is all of the required materials necessary for a determination. If there are any questions or needs for further documentation please contact me. We are anxious to receive a determination so that we can commence our program to solicit grants from foundations.

Sincerely yours,

Donald D. Job
President

Enclosures

Form **1023**
(Rev. March 1986)
Department of the Treasury
Internal Revenue Service

Application for Recognition of Exemption
Under Section 501(c)(3) of the Internal Revenue Code

For Paperwork Reduction Act Notice, see page 1 of the instructions.

OMB No. 1545-0056
Expires 3-31-89

To be filed in the key district for the area in which the organization has its principal office or place of business.

This application, when properly completed, constitutes the notice required under section 508(a) of the Internal Revenue Code so that an applicant may be treated as described in section 501(c)(3) of the Code, and the notice required under section 508(b) for an organization claiming not to be a private foundation within the meaning of section 509(a). **(Read the instructions for each part carefully before making any entries.)** If required information, a conformed copy of the organizing and operational documents, or financial data are not furnished, the application will not be considered on its merits and the organization will be notified accordingly. Do not file this application if the applicant has no organizing instrument (see Part II).

Part I Identification

1 Full name of organization
Innovative Products Research and Services, Inc.

2 Employer identification number (If none, see instructions)

3a Address (number and street)
P.O. Box 335

Check here if applying under section:
☐ 501(e) ☐ 501(f) ☐ 501(k)

3b City or town, state, and ZIP code
Lexington, Massachusetts 02173

4 Name and telephone number of person to be contacted
Dr. Donald Job (617) 862-5008

5 Month the annual accounting period ends
December

6 Date incorporated or formed
August 11, 1988

7 Activity codes
180 | 199

8 Has the organization filed Federal income tax returns or exempt organization information returns? . . . . . ☐ Yes ☒ No
If "Yes," state the form number(s), years filed, and Internal Revenue office where filed.

Part II Type of Entity and Organizational Document (see instructions)

Check the applicable entity box below and attach a **conformed** copy of the organization's organizing document and bylaws as indicated for each entity.

☒ Corporation—Articles of incorporation and bylaws. ☐ Trust—Trust indenture. ☐ Other—Constitution or articles of association and bylaws.

Part III Activities and Operational Information

1 What are or will be the organization's sources of financial support? List in order of size.

See attached statement.

2 Describe the organization's fund-raising program, both actual and planned, and explain to what extent it has been put into effect. (Include details of fund-raising activities such as selective mailings, formation of fund-raising committees, use of professional fund raisers, etc.) Attach representative copies of solicitations for financial support.

See attached statement.

I declare under the penalties of perjury that I am authorized to sign this application on behalf of the above organization and I have examined this application, including the accompanying statements, and to the best of my knowledge it is true, correct, and complete.

(Signature) (Title or authority of signer) (Date)

Part III Activities and Operational Information (Continued)

3 Give a **detailed** narrative description of the organization's past, present, and proposed future activities, and the purposes for which it was formed. The narrative should identify the specific benefits, services, or products the organization has provided or will provide. If the organization is not fully operational, explain what stage of development its activities have reached, what further steps remain for it to become fully operational, and when such further steps will take place. (**Do not state the purposes and activities of the organization in general terms or repeat the language of the organizational documents.**) If the organization is a school, hospital, or medical research organization, include enough information in your description to clearly show that the organization meets the definition of that particular activity that is contained in the instructions for Part VI-A.

See attached statement.

4 The membership of the organization's governing body is:

a Names, addresses, and titles of officers, directors, trustees, etc.	b Annual compensation
See attached statement.	

Part III Activities and Operational Information (Continued)

4 c Do any of the above persons serve as members of the governing body by reason of being public officials or being appointed by public officials? . . . . . ☐ Yes ☒ No
If "Yes," name those persons and explain the basis of their selection or appointment.

d Are any members of the organization's governing body "disqualified persons" with respect to the organization (other than by reason of being a member of the governing body) or do any of the members have either a business or family relationship with "disqualified persons?" (See the Specific Instructions for line 4d.) . . . . ☐ Yes ☒ No
If "Yes," explain.

e Have any members of the organization's governing body assigned income or assets to the organization, or is it anticipated that any current or future member of the governing body will assign income or assets to the organization? . . . . . ☒ Yes ☐ No
If "Yes," attach a complete explanation stating which applies and including copies of any assignments plus a list of items assigned. See attached statement.

5 Does the organization control or is it controlled by any other organization? . . . . . ☐ Yes ☒ No
Is the organization the outgrowth of another organization, or does it have a special relationship to another organization by reason of interlocking directorates or other factors? . . . . . ☒ Yes ☐ No
If either of these questions is answered "Yes," explain.

See attached statement.

6 Is the organization financially accountable to any other organization? . . . . . ☒ Yes ☐ No
If "Yes," explain and identify the other organization. Include details concerning accountability or attach copies of reports if any have been submitted.

See attached statement.

7 a What assets does the organization have that are used in the performance of its exempt function? (Do not include property producing investment income.) If any assets are not fully operational, explain their status, what additional steps remain to be completed, and when such final steps will be taken.

See attached statement.

b To what extent have you used, or do you plan to use, contributions as an endowment fund, i.e., hold contributions to produce income for the support of your exempt activities?

See attached statement.

8 Will any of the organization's facilities be managed by another organization or individual under a contractual agreement? . . . . . ☐ Yes ☒ No
If "Yes," attach a copy of each contract and explain the relationship between the applicant and each of the other parties.

Part III Activities and Operational Information (Continued)

9 a Have the recipients been required or will they be required to pay for the organization's benefits, services, or products? . . . . . ☒ Yes ☐ No

If "Yes," explain and show how the charges are determined.

See attached statement.

b Does or will the organization limit its benefits, services, or products to specific classes of individuals? . . . . ☐ Yes ☒ No

If "Yes," explain how the recipients or beneficiaries are or will be selected.

See attached statement.

10 Is the organization a membership organization? . . . . . ☐ Yes ☒ No

If "Yes," complete the following:

a Describe the organization's membership requirements and attach a schedule of membership fees and dues.

b Describe your present and proposed efforts to attract members, and attach a copy of any descriptive literature or promotional material used for this purpose.

c Are benefits, services, or products limited to members? . . . . . ☐ Yes ☐ No

If "No," explain.

11 Does or will the organization engage in activities tending to influence legislation or intervene in any way in political campaigns? . . . . . ☐ Yes ☒ No

If "Yes," explain. (**Note:** *You may wish to file Form 5768, Election/Revocation of Election by an Eligible Section 501(c)(3) Organization to Make Expenditures to Influence Legislation.)*

See attached statement.

12 Does the organization have a pension plan for employees? See attached statement. . . . . ☐ Yes ☒ No

13 a Are you filing Form 1023 within 15 months from the end of the month in which you were created or formed as required by section 508(a) and the related regulations? (See General Instructions.). . . . . ☒ Yes ☐ No

b If you answer "No," to 13a and you claim that you fit an exception to the notice requirements under section 508(a), attach an explanation of your basis for the claimed exception.

c If you answer "No," to 13a and section 508(a) does apply to you, you may be eligible for relief under regulations section 1.9100 from the application of section 508(a). Do you wish to request relief? . . . . . ☐ Yes ☐ No

d If you answer "Yes," to 13c, attach a detailed statement that satisfies the requirements of Rev. Proc. 79-63.

e If you answer "No," to both 13a and 13c and section 508(a) does apply to you, your qualification as a section 501(c)(3) organization can be recognized only from the date this application is filed with your key District Director. Therefore, do you want us to consider your application as a request for recognition of exemption as a section 501(c)(3) organization from the date the application is received and not retroactively to the date you were formed (see instructions)? . . . . . ☐ Yes ☐ No

Part IV Statement as to Private Foundation Status (see instructions)

1 Is the organization a private foundation? . . . . . ☐ Yes ☒ No

2 If you answer "Yes," to question 1 and the organization claims to be a private operating foundation, check here ▶ ☐ and complete Part VII.

3 If you answer "No," to question 1, indicate the type of ruling you are requesting regarding the organization's status under section 509 by checking the box(es) below that apply:

a Definitive ruling under section 509(a)(1), (2), (3), or (4) ▶ ☐. Complete Part VI.

b Advance ruling under ▶ ☒ sections 509(a)(1) and 170(b)(1)(A)(vi) or ▶ ☐ section 509(a)(2)—see instructions.

(**Note:** *If you want an advance ruling, you must complete and attach two Forms 872-C to the application.)*

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.

Attachment to Form 1023

Part III - Activities and Operational Information

1. It is anticipated that Innovative Products Research & Services, Inc. ("IPRS") will have as its primary source of support contributions received from individuals, governmental entities, corporations and charitable organizations.

2. IPRS anticipates that it will conduct fund-raising activities to support its operations and tax exempt purposes. IPRS plans to solicit contributions from individuals, corporations, trade groups and governmental entities by means of selective mailings, grant proposals and other forms of charitable solicitation.

a. Initial contacts have been made with the Energy-Related Invention Program of the U.S. Department of Energy and a letter of interest received. Funding of a proposal is pending.

b. Some trade and professional associations and certain non-profits have been approached regarding philosophical support of IPRS's mission and potential support in cash contributions, in-kind services and/or grants for carrying out specific exempt research. Copies of letters of introduction and endorsements received are attached.

c. Foundations known to be supportive of IPRS's goals will be given proposals once our 501(c)(3) status is approved.

d. Other aspects of the fund-raising program are still in the planning stages.

e. IPRS does not anticipate the use of professional fund-raising counsel.

f. Founders, board members, employees of and consultants to IPRS will be involved in various aspects of seeking grants and contributions and in carrying out the tasks associated with a particular research or educational project.

3. IPRS was organized as a Massachusetts charitable organization on August 11, 1988, in order to study and improve the scientific/technological invention and innovation processes. Among the incorporators are scientists and educators who, through their individual and group professional endeavors, have come to recognize an issue of great concern to the scientific community, in specific, and to the greater society, in general; namely, the failure to consistently and reliably convert technology and innovation into forms which will benefit society.

IPRS was organized to establish through study, collegial dialogue, educational workshops and the writing of related research papers a coherent framework for understanding the invention and innnovation processes in the scientific and technological domains.

Technology transfer from federal laboratories and agencies has recently received increasing attention. IPRS expects to provide assistance in such efforts through its research into the process and through the development of writings and workshops which will educate government officials tasked with technology transfer.

The New England scientific community has been especially effective in obtaining government support for research but has not been particularly effective in converting those research findings into useful forms for societal benefit. IPRS expects to work closely with local technology centers including state-sponsored agencies, universities, hospitals and independent researchers to provide assistance in such matters.

One of the factors leading to the formation of IPRS was the recognition that existing non-profit organizations such as the Inventors Association of New England (and similar support organizations throughout the country) and government programs such as the U.S. Department of Energy sponsored National Innovation Workshops do not go far enough in closing the gap between the inventor/innovator and the business community. To this end, IPRS plans to provide training and conduct or sponsor workshops aimed at educating inventors and other scientists about the invention and innovation processes. Topics might include discussion of such concerns as the methodologies for evaluating inventions, the patent process, prototyping resources, risk management, licensing strategies and management and organizational factors.

An important function of IPRS will be to support an Invention Resources Data Bank and Innovation Information Exchange. Both paper-based and electronic media libraries will be supported for ease of use by persons and organizations interested in invention and innovation. In order to provide this database/library service, IPRS may contract for the services of Innovative Products Development Center, Inc. (the "Development Center"), a Massachusetts business corporation, being created by Donald Job and other officers of IPRS. The Development Center has a number of proprietary files consisting of names of inventors, vendors, manufacturers and technical resources. An electronic database is expected to be constructed for use by IPRS and its constituency. Such a database would enable researchers and other users to find vital sources of information and/or resources to facilitate their research. References to the patent process, prototyping, engineering, materials, regulations, marketing, licensing, product management, consultants, government policy, state and federal support agencies, et al. would be retrievable.

IPRS plans to establish laboratory facilities for the active engagement in basic research in the fields of computer science, electronics, medicine and other scientific disciplines. IPRS plans to obtain support from foundations, private individuals, government agencies and from other charitable and scientific organizations for carrying out basic research in the fields of medicine, science, economic development and technology transfer. Among the federal agencies to be approached for grants in support

of their objectives are Economic Development Administration, National Institutes of Health, National Science Foundation, Department of Energy, Department of Commerce, Congress' Office of Technology Assessment, NASA, and Department of Defense.

The stage of organizational development is the completed incorporation within the Commonwealth of Massachusetts, the drafting of an over-all plan, the identification of key officers and the submittal of a $10,000 proposal to the Department of Energy. We have also obtained letters of endorsement from some organizations and have outlined some proposals for targetted funding sources. A permanent location for offices has not yet been selected and laboratory facilities currently reside in officers' and consultants' homes or businesses pending funding for consolidation.

We plan to add to our Board of Directors so that the majority will not be employed or associated with the Development Center. In addition, a number of prospects for serving on the Advisory Boards have been identified and will be approached in the near future.

4(a) and (b). Attached is a list of the Board of Directors of IPRS. Directors may be compensated for quarterly meeting attendance at a rate to be determined by the board of directors but not to exceed $2,000 per year. Such compensation will be contingent upon availability of undesignated operating funds.

Officers may be compensated in proportion to time spent in serving IPRS's exempt purposes and/or according to their contribution to sponsored programs for which a set fee-for-service as been agreed upon.

4(e). To date, no officers or directors have assigned any assets to IPRS. It is possible that future Officers or Directors may contribute modest amounts in support of IPRS' charitable and scientific activities.

5. IPRS was created on August 11, 1988 in an effort to address the problems confronting modern innovators, educators, and the general public caused by the increasingly complex and poorly understood invention/innovation process. Dr. Donald Job and certain other officers of IPRS currently plan to organize a separate and distinct business corporation, the Development Center, which will not control or be controlled by IPRS.

The for-profit Development Center whose purpose is to provide product development services will benefit from IPRS's research just as any other organization might. IPRS should benefit from an association with the Development Center in having access to its expertise and resources. In order to assure no conflict of interest or appearance of same, IPRS will add to its Board of Directors so that the majority of directors will not be employed by or associated with the Development Center.

6. IPRS will not be financially accountable to any other corporation or association. As a public charity, IPRS is required to make annual filings with the Division of Public Charities of the Department of the Attorney General of the Commonwealth of Massachusetts. These filings are also open to the general public for inspection.

7(a). IPRS currently has no tangible assets. IPRS may at some future time obtain assets which will be used to further its educational, scientific and charitable purposes. Assets in the form of research equipment, furnishings and equipment may be acquired as funding becomes available or may be received as donations.

7(b). IPRS does not currently plan to use contributions as an endowment fund.

9(a). Users of the Invention Resources Data Bank and Innovation Information Exchange may be charged a nominal fee to cover the costs of such services. Fees for workshops or other educational endeavors will be established to cover costs or will be reduced in accordance with sponsor's directives. Charges will be determined based upon actual costs plus an allocation of appropriate overhead.

9(b). IPRS is organized to benefit the scientific community specifically and the public generally by assisting scientists to develop new technology which will increase opportunities for the public in general.

11. IPRS does not intend to engage in activities tending to influence legislation or intervene in any way in political campaigns. However, if any pending legislation adversely affects the conduct of its operations, IPRS might, either individually or in association with other organizations, communicate its postion. IPRS intends to pursue a policy of strict neutrality in all political campaigns and will not endorse any candidate for public office.

12. Currently, IPRS does not have any employees. Even when ones are hired, no pension plan is anticipated in the first few years of operation.

PART V. - FINANCIAL DATA

See Attached Cash Flow Pro Formas from present through 1991 and Pro Forma Balance Sheets through 1990.

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.

BOARD OF DIRECTORS
November, 1988

NAME	RESIDENCE	POST OFFICE ADDRESS
Donald D. Job President & Treasurer	24 Oxbow Road Lexington, MA 02173	P.O. Box 335 Lexington, MA 02173
Harry C. King Clerk	406 Great Elm Way Acton, MA 01720	P.O. Box 335 Lexington, MA 02173
James Lyddy	122 Claremont Ave. Arlington, MA 02174	P.O. Box 335 Lexington, MA 02173
Carl D. Hardy	113 Wood End Lane Medfield, MA 02052	P.O. Box 335 Lexington, MA 02173

OFFICERS

Donald D. Job, PRESIDENT AND TREASURER

Harry C. King, CLERK

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.
YEAR - 1988

	JAN'88	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
SOURCE OF FUNDS													
DEPT OF ENERGY(U.S.)	0	0	0	0	0	0	0	0	0	0	1	0	1
FOUNDATION-1	0	0	0	0	0	0	0	0	0	0	0	1	1
CORPORATE SPONSORS-1	0	0	0	0	0	0	0	0	0	0	0	1	1
CONTRACTS	0	0	0	0	0	0	0	0	0	0	0	0	0
CASH ON HAND	0				1000		1000						
REVENUES $10000 DOE	0	0	0	0	0	0	0	0	0	0	10000	0	10000
$25000/FNDN	0	0	0	0	0	0	0	0	0	0	0	25000	25000
$25000/CORP	0	0	0	0	0	0	0	0	0	0	0	25000	25000
CONTRACTS	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL REVENUE	0	0	0	0	0	0	0	0	0	0	10000	50000	60000
OPERATING EXPENSES													
GENERAL MKTG EXP.													
PUBLIC RELATIONS (.010)	0	0	0	0	0	0	0	0	0	0	100	500	600
PROMOTIONAL MATER.(.010)	0	0	0	0	0	0	0	0	0	0	100	500	600
TRAVEL & ENTER. (.005)	0	0	0	0	0	0	0	0	0	0	50	250	300
TOTAL MKTG EXP.	0	0	0	0	0	0	0	0	0	0	250	1250	1500
PERSONNEL													
PRES./EXEC. DIR./R&D	0	0	0	0	0	0	0	0	0	0	2000	2000	4000
DIRECTOR OF MARKETING	0	0	0	0	0	0	0	0	0	0	500	500	1000
MARKETING COMMUNICATIONS/RES.	0	0	0	0	0	0	0	0	0	0	500	500	1000
FINANCIAL ANALYST	0	0	0	0	0	0	0	0	0	0	250	250	500
LICENSING CONSULTANT	0	0	0	0	0	0	0	0	0	0	0	1000	1000
ADMINISTRATOR	0	0	0	0	0	0	0	0	0	0	0	800	800
OFFICE HELP	0	0	0	0	0	0	0	0	0	0	500	500	1000
SR.MECH. ENG.	0	0	0	0	0	0	0	0	0	0	0	500	500
SR.ELECTRONICS ENG.	0	0	0	0	0	0	0	0	0	0	500	500	1000
MTRLS/MFRG SPEC.	0	0	0	0	0	0	0	0	0	0	0	500	500
DESIGNER/ GRAPHICS	0	0	0	0	0	0	0	0	0	0	0	500	500
TECHNICIAN	0	0	0	0	0	0	0	0	0	0	0	500	500
BENEFITS @36%	0	0	0	0	0	0	0	0	0	0	1530	2898	4428
TOTAL SALARIES	0	0	0	0	0	0	0	0	0	0	5780	10948	16728
OTHER EXPENSE													
FACILITIES	0	0	0	0	0	0	0	0	400	400	400	400	1600
TELEPHONE	0	0	0	0	0	20	20	20	50	50	50	50	260
UTILITIES	0	0	0	0	0	0	0	0	0	50	50	50	150
INSURANCE	0	0	0	0	0	0	0	0	50	50	50	50	200
DATA PROC.	0	0	0	0	0	50	50	50	50	50	50	50	350
LEGAL COUNSEL	0	0	0	0	0	0	0	200	200	500	1000	1000	2900
OUTSIDE SHOP SERVICES	0	0	0	0	0	0	0	0	0	0	1000	1000	2000
PATENTS (SEARCH & REV)	0	0	0	0	0	0	0	0	0	0	50	500	550
OFFICE SUPPLIES	0	0	0	0	0	0	20	20	20	20	20	20	120
TOTAL OTHER EXP.	0	0	0	0	0	70	90	290	770	1120	2670	3120	8130
TOTAL OPERATING EXP.	0	0	0	0	0	70	90	290	770	1120	8700	15318	26358
OPERATING INCOME (LOSS)	0	0	0	0	0	-70	-90	-290	-770	-1120	1300	34682	33642
ACCUMULATED CASH FLOW	0	0	0	0	1000	930	1840	1550	780	-340	960	35642	29642
CAPITAL EXPENSES	0	0	0	0	0	0	0	0	0	0	0	3000	3000

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.
YEAR - 1989

	JAN'89	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
SOURCE OF FUNDS													
DEPT OF ENERGY(U.S.)	0	0	0	0	0	0	0	0	0	0	1	0	1
FOUNDATION-1	0	0	1	0	0	1	0	0	1	0	0	0	3
CORPORATE SPONSORS-1	0	1	0	0	0	0	1	0	0	0	1	0	3
CONTRACTS	0	0	0	0	0	0	0	1	0	1	0	0	2
CASH ON HAND	26642												
REVENUES $10000 DOE	0	0	0	0	0	0	0	0	0	0	10000	0	10000
$25000/FNDN	0	0	25000	0	0	25000	0	0	25000	0	0	0	75000
$25000/CORP	0	25000	0	0	0	0	25000	0	0	0	25000	0	75000
CONTRACTS	0	0	0	0	0	0	0	50000	0	50000	0	0	100000
ROYALTY	0	0	0	0	0	0	0	0	0	0	0	500	500
TOTAL REVENUE	0	25000	25000	0	0	25000	25000	50000	25000	50000	35000	500	260500
OPERATING EXPENSES													
GENERAL MKTG EXP.													
PUBLIC RELATIONS (.010)	0	250	250	0	0	250	250	500	250	500	350	5	2605
PROMOTIONAL MATER.(.010)	0	250	250	0	0	250	250	500	250	500	350	5	2605
TRAVEL & ENTER. (.005)	0	125	125	0	0	125	125	250	125	250	175	2	1302
TOTAL MKTG EXP.	0	625	625	0	0	625	625	1250	625	1250	875	12	6512
PERSONNEL													
PRES./EXEC. DIR./R&D	2000	2000	2000	2000	2500	2500	2500	2500	2500	2500	2500	3000	28500
DIRECTOR OF MARKETING	500	500	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	10500
MARKETING COMMUNICATIONS/RES.	500	500	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	10500
FINANCIAL ANALYST	250	500	500	500	500	500	500	500	500	500	500	1000	6250
LICENSING CONSULTANT	500	500	500	500	500	500	500	500	500	500	500	500	6000
ADMINISTRATOR	800	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	17300
OFFICE HELP	500	500	500	500	500	500	500	500	500	500	500	500	6000
SR.MECH. ENG.	500	600	600	600	600	600	600	600	600	600	600	600	7100
SR.ELECTRONICS ENG.	500	600	600	600	600	600	600	600	600	600	600	600	7100
MTRLS/MFRG SPEC.	500	500	500	500	500	500	500	500	500	500	500	500	6000
DESIGNER/ GRAPHICS	500	750	750	750	750	750	750	750	750	750	750	750	8750
TECHNICIAN	500	500	500	2000	2000	2000	2000	2000	2000	2000	2000	2000	19500
BENEFITS @36%	2718	3222	3222	4122	4302	4302	4302	4302	4302	4302	4302	4662	48060
TOTAL SALARIES	10268	12172	12172	15572	16252	16252	16252	16252	16252	16252	16252	17612	181560
OTHER EXPENSE													
FACILITIES	400	400	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	10800
TELEPHONE	50	300	300	300	300	300	300	300	300	300	300	300	3350
UTILITIES	50	200	200	200	200	200	200	200	200	200	200	200	2250
INSURANCE	50	100	100	100	100	100	100	100	100	100	100	100	1150
DATA PROC.	50	50	50	50	50	50	50	50	50	50	50	50	600
AUTO LEASE	0	0	0	0	500	500	500	500	500	500	500	500	4000
LEGAL COUNSEL	0	0	200	500	0	0	500	200	200	0	0	200	1800
OUTSIDE SHOP SERVICES	0	0	200	200	1000	1000	1000	1000	1000	1000	200	200	6800
PRODUCT DESIGN/ENG. CONS	50	500	500	500	500	500	500	500	500	500	500	500	5550
PATENTS (SEARCH & REV)	500	500	500	500	500	500	500	500	500	500	500	500	6000
OFFICE SUPPLIES	20	100	100	100	100	100	200	200	200	200	200	200	1720
TOTAL OTHER EXP.	1170	2150	3150	3450	4250	4250	4850	4550	4550	4350	3550	3750	44020
TOTAL OPERATING EXP.	11438	14947	15947	19022	20502	21127	21727	22052	21427	21852	20677	21374	232092
OPERATING INCOME (LOSS)	-11438	10053	9053	-19022	-20502	3873	3273	27948	3573	28148	14323	-20874	28408
ACCUMULATED CASH FLOW	15204	25257	34310	15288	-5214	-1341	1932	29880	33453	61601	75924	55050	45050
CAPITAL EXPENSES	0	0	5000	0	0	0	0	0	0	0	5000	0	10000

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.
YEAR - 1990

	JAN'90	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
SOURCE OF FUNDS													
U.S. AGENCIES (RES.)	1	0	0	0	0	0	1	0	0	0	1	0	3
FOUNDATION-1	0	0	1	0	0	1	0	0	1	0	0	0	3
CORPORATE SPONSORS-1	0	1	0	1	0	0	0	0	0	0	0	1	3
CONTRACTS	0	0	0	0	0	0	0	1	0	1	0	0	2
CASH ON HAND	45050												
REVENUES $30000/FEDERAL GRANT	30000	0	0	0	0	0	30000	0	0	0	30000	0	90000
$25000/FNDN	0	0	25000	0	0	25000	0	0	25000	0	0	0	75000
$25000/CORP	0	25000	0	25000	0	0	0	0	0	0	0	25000	75000
CONTRACTS	0	0	0	0	0	0	0	50000	0	50000	0	0	100000
ROYALTY	500	500	500	500	500	500	500	1000	1000	1000	1000	1000	8500
TOTAL REVENUE	30500	25500	25500	25500	500	25500	30500	51000	26000	51000	31000	26000	348500
OPERATING EXPENSES													
GENERAL MKTG EXP.													
PUBLIC RELATIONS (.010)	305	255	255	255	5	255	305	510	260	510	310	260	3485
PROMOTIONAL MATER.(.010)	305	255	255	255	5	255	305	510	260	510	310	260	3485
TRAVEL & ENTER. (.005)	152	127	127	127	2	127	152	255	130	255	155	130	1739
TOTAL MKTG EXP.	762	637	637	637	12	637	762	1275	650	1275	775	650	8709
PERSONNEL													
PRES./EXEC. DIR./R&D	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	36000
DIRECTOR OF MARKETING	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000
MARKETING COMMUNICATIONS/RES.	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	24000
FINANCIAL ANALYST	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	1000	11500
LICENSING CONSULTANT	800	800	800	800	800	800	800	800	800	800	800	800	9600
ADMINISTRATOR	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	18000
OFFICE HELP	750	750	750	750	750	750	750	750	750	750	750	750	9000
SR.MECH. ENG.	600	600	600	600	600	600	600	600	600	600	600	600	7200
SR.ELECTRONICS ENG.	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	14400
MTRLS/MFRG SPEC.	500	500	500	500	500	500	500	500	500	500	500	500	6000
DESIGNER/ GRAPHICS	750	750	750	750	750	750	750	750	750	750	750	750	9000
TECHNICIAN	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	26400
BENEFITS @36%	5508	5508	5508	5508	5508	5508	5508	5508	5508	5508	5328	5508	65916
TOTAL SALARIES	20808	20808	20808	20808	20808	20808	20808	20808	20808	20808	20128	20808	249016
OTHER EXPENSE													
FACILITIES	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000
TELEPHONE	300	300	300	300	300	300	300	300	300	300	300	300	3600
UTILITIES	200	200	200	200	200	200	200	200	200	200	200	200	2400
INSURANCE	100	100	100	100	100	100	100	100	100	100	100	100	1200
DATA PROC.	75	75	75	75	75	75	75	75	75	75	75	75	900
AUTO LEASE	500	500	500	500	500	500	500	500	500	500	500	500	6000
LEGAL COUNSEL	200	200	200	500	500	500	500	200	200	200	200	200	3600
OUTSIDE SHOP SERVICES	200	200	200	200	1000	1000	1000	1000	1000	1000	1000	1000	8800
PRODUCT DESIGN/ENG. CONS	500	500	500	500	500	500	500	500	500	500	500	500	6000
PATENTS (SEARCH & REV)	500	500	500	500	500	500	500	500	500	500	500	500	6000
OFFICE SUPPLIES	200	200	200	200	200	200	200	200	200	200	200	200	2400
TOTAL OTHER EXP.	3775	3775	3775	4075	4875	4875	4875	4575	4575	4575	4575	4575	52900
TOTAL OPERATING EXP.	25345	25220	25220	25520	25695	26320	26445	26658	26033	26658	25478	26033	310625
OPERATING INCOME (LOSS)	5155	280	280	-20	-25195	-820	4055	24342	-33	24342	5522	-33	37875
ACCUMULATED CASH FLOW	50205	50485	50765	50745	25550	24730	28785	53127	53094	77436	82958	82925	62925
CAPITAL EXPENSES	0	0	5000	0	0	0	0	0	0	0	15000	0	20000

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.
YEAR - 1991

	JAN'91	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
SOURCE OF FUNDS													
U.S. AGENCIES (RES.)	1	0	0	0	1	0	1	0	0	0	1	0	4
FOUNDATION-1	0	0	1	0	0	1	0	0	1	0	0	0	3
CORPORATE SPONSORS-1	0	1	0	1	0	0	0	0	0	0	0	1	3
CONTRACTS	0	0	0	0	0	0	0	1	0	1	0	0	2
CASH ON HAND	62925												
REVENUES $30000/FEDERAL GRANT	30000	0	0	0	30000	0	30000	0	0	0	30000	0	120000
$25000/FNDN	0	0	25000	0	0	25000	0	0	25000	0	0	0	75000
$25000/CORP	0	25000	0	25000	0	0	0	0	0	0	0	25000	75000
CONTRACTS	0	0	0	0	0	0	0	50000	0	50000	0	0	100000
ROYALTY	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	11500
TOTAL REVENUE	30500	26000	26000	26000	31000	26000	31000	51000	26000	51000	31000	26000	381500
OPERATING EXPENSES													
GENERAL MKTG EXP.													
PUBLIC RELATIONS (.010)	305	260	260	260	310	260	310	510	260	510	310	260	3815
PROMOTIONAL MATER.(.010)	305	260	260	260	310	260	310	510	260	510	310	260	3815
TRAVEL & ENTER. (.005)	152	130	130	130	155	130	155	255	130	255	155	130	1907
TOTAL MKTG EXP.	762	650	650	650	775	650	775	1275	650	1275	775	650	9537
PERSONNEL													
PRES./EXEC. DIR./R&D	3000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	47000
DIRECTOR OF MARKETING	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000
MARKETING COMMUNICATIONS/RES.	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	30000
FINANCIAL ANALYST	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	1000	11500
LICENSING CONSULTANT	800	800	800	800	800	800	800	800	800	800	800	800	9600
ADMINISTRATOR	1500	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	23500
OFFICE HELP	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000
SR.MECH. ENG.	600	600	600	600	600	600	600	600	600	600	600	600	7200
SR.ELECTRONICS ENG.	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	36000
MTRLS/MFRG SPEC.	500	500	500	500	500	500	500	500	500	500	500	500	6000
DESIGNER/ GRAPHICS	750	750	750	750	750	750	750	750	750	750	750	750	9000
MEDICAL CONSULTANT	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	
TECHNICIAN	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	26400
BENEFITS @36%	7326	7866	7866	7866	7866	7866	7866	7866	7866	7866	7686	7866	93672
TOTAL SALARIES	27676	29716	29716	29716	29716	29716	29716	29716	29716	29716	29036	29716	353872
OTHER EXPENSE													
FACILITIES	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000
TELEPHONE	300	300	300	300	300	300	300	300	300	300	300	300	3600
UTILITIES	200	200	200	200	200	200	200	200	200	200	200	200	2400
INSURANCE	100	100	100	100	100	100	100	100	100	100	100	100	1200
DATA PROC.	75	75	75	75	75	75	75	75	75	75	75	75	900
AUTO LEASE	500	500	500	500	500	500	500	500	500	500	500	500	6000
LEGAL COUNSEL	200	200	200	500	500	500	500	200	200	200	200	200	3600
OUTSIDE SHOP SERVICES	200	200	200	200	1000	1000	1000	1000	1000	1000	1000	1000	8800
PRODUCT DESIGN/ENG. CONS	500	500	500	500	500	500	500	500	500	500	500	500	6000
PATENTS (SEARCH & REV)	500	500	500	500	500	500	500	500	500	500	500	500	6000
OFFICE SUPPLIES	200	200	200	200	200	200	200	200	200	200	200	200	2400
TOTAL OTHER EXP.	3775	3775	3775	4075	4875	4875	4875	4575	4575	4575	4575	4575	52900
TOTAL OPERATING EXP.	32213	34141	34141	34441	35366	35241	35366	35566	34941	35566	34386	34941	416309
OPERATING INCOME (LOSS)	-1713	-8141	-8141	-8441	-4366	-9241	-4366	15434	-8941	15434	-3386	-8941	-34809
ACCUMULATED CASH FLOW	61212	53071	44930	36489	32123	22882	18516	33950	25009	40443	37057	28116	8116
CAPITAL EXPENSES	0	0	5000	0	0	0	0	0	0	0	15000	0	20000

IPRS
PRO FORMA BALANCE SHEET
Year Ending
December 31, 1988

ASSETS	
Cash	28,642
Interest Bearing Account Receipts	1,000
Accounts Receivable	-0-
Total Current Assets	29,642
Equipment @ Cost less accumulated depreciation	2,000
Fixtures & Furnishings	1,000
TOTAL ASSETS:	32,642
LIABILITIES & NET WORTH	
Current Liabilities	
Accounts Payable	13,000
Grant Commitments	12,642
Total Current Liabilities	25,642
Long-Term Debt	-
TOTAL LIABILITIES:	$ 25,642
Fund Balances or Net Worth	7,000
TOTAL LIABILITIES AND NET WORTH	$32,642

PRO FORMA BALANCE SHEET

December 31, 1989

ASSETS

Cash	43,050
Interest Bearing Account Receipts	2,000
Accounts Receivable	25,000
Total Current Assets	70,050
Equipment @ Cost less accumulated depreciation	9,000
Fixtures & Furnishings	2,000
Goodwill and Patents	5,000
TOTAL ASSETS:	86,050

LIABILITIES & NET WORTH

Current Liabilities	
Accounts Payable	25,000
Grant Commitments	39,000
Total Current Liabilities	64,000
Long-Term Debt	-
TOTAL LIABILITIES:	$ 64,000
Fund Balances or Net Worth	$ 22,050
TOTAL LIABILITIES AND NET WORTH	$ 86,050

PRO FORMA BALANCE SHEET

December 31, 1990

ASSETS

Cash	59,925
Interest Bearing Account Receipts	3,000
Accounts Receivable	45,000
Total Current Assets	107,925
Equipment @ Cost less accumulated depreciation	26,000
Fixtures & Furnishings	4,000
Goodwill and Patents	15,000
TOTAL ASSETS:	152,925

LIABILITIES & NET WORTH

Current Liabilities	
Accounts Payable	45,000
Grant Commitments	79,925
Total Current Liabilities	124,925
Long-Term Debt	-
TOTAL LIABILITIES:	$124,925
Fund Balances or Net Worth	$ 28,000
TOTAL LIABILITIES AND NET WORTH	$152,925

SAMPLES OF CORRESPONDENCE

AND

LETTERS OF ENDORSEMENT

1. Request Boston University Prof. Lund for support of concept.

2. Request Prof. Leone to serve on Board of Directors

3. Request support in form of computer equipment and operating funds from Digital Equipment Corp.

4. Request individual and/or corporate contribution for a specific project.

5. Letter of Support from U.S. Department of Energy.

6. Letter of Support from Inventors Association of New England.

IPRS Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173
(617) 862-5008

November 14, 1988

Professor Robert Leone
Dept. of Operations Management
Boston University
Commonwealth Avenue
Boston, MA 02199

Dear Professor Leone:

Your input and counsel during the formative stages of our organization has been most helpful. Your current association with Boston University and with a thriving consulting business provide you with a perspective which would be valuable to IPRS on an ongoing basis. Based on this, we would like to invite you to serve on our Board of Directors.

Board Members will be responsible for meeting up to four times per year including the annual meeting the second Wednesday in March at 7:00 PM. Expenses will be reimbursed and a stipend will be established by the board based on guidelines in the corporate charter.

If you decide to accept as I hope you will, a copy of the business plan will be forwarded to you along with the Articles of Incorporation and Bylaws if you so request. A draft of a letter of acceptance is enclosed for your convenience.

Sincerely yours,

Donald D. Job, Ph.D.
President

Enclosure

IPRS Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173
(617) 862-5008

November 14, 1988

Prof. Robert T. Lund
Center for Technology and Policy
Boston University
100 Cummington Street
Boston, MA 02215

Dear Professor Lund:

Per our communication some months ago, we are interested in exploring ways to work with your staff on developing a central resource for information on innovation and technology transfer.

Innovative Products Research & Services, Inc. (IPRS) has been formed to study, document and promulgate information which will especially assist persons who may be gifted as scientists and teachers but not as entrepreneurs. Using the Invention Resource Network of IPRS, such individuals can learn how to license technology rather than building businesses.

One part of our operations is the maintenance of a network between universities, manufacturers, trade groups and independent inventors. Such a network will be complementary to that being funded by Massachusetts Centers of Excellence for a Skills-Based Automation Documentation Center which we discussed previously. I would like to meet with you and others at Boston University to explore areas of mutual interest.

In any event, it would be helpful in our fund-raising efforts if you would provide me a letter indicating your agreement that an Invention Resource Network being developed by IPRS could be a valuable asset to your faculty and to the public at large.

Sincerely yours,

Donald D. Job, Ph.D.
President

IPRS Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173
(617) 862-5008

November 14, 1988

Mr. Kenneth Olsen, President
Digital Equipment Corporation
129 Parker Street
Maynard, MA 01754

Dear Mr. Olsen:

You have done much to elevate the status of inventors in this country through your success in building Digital Equipment Corporation to be the major technological leader it is. Our organization has been formed to study and document the factors involved in successful innovation and in particular the processes whereby innovations can be brought to the public.

We are building a database of resources and information on invention, innovation and technology transfer and would like to make this valuable information available to inventors and entrepreneurs in the New England area. Since your company is the leader in networking and database management, and since Digital's VAX's are pre-eminent in the university and research environments, we would like to use your hardware/software.

We are seeking cash grants for operating funds as well as computer equipment (such as a VAX 11/780 with electronic communications software). A complete specification is attached for your consideration.

I am sure that the technical and marketing people at Digital could benefit from the resource center we are building and I am equally sure that researchers in universities, government laboratories and small indepedent research companies will benefit from a single local repository of a databank on innovation.

Please refer us to the appropriate people within Digital to implement our requests formally.

Sincerely yours,

Donald D. Job, Ph.D.
President

IPRS Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173
(617) 862-5008

November 21, 1988

Mr. William Rosenberg, Founder
Dunkin Donuts of America
N. Randolph Inudstrial Park
Randolph, MA 02368

Dear Mr. Rosenberg:

As a successful entrepreneur, you are doubtless aware of the challenges of building a business and at the same time both the personal rewards and the benefits to our communities.

The role of new product creation and business formation in the U.S. economy is a major focus of Innovative Products Research & Services (IPRS). We believe that educators at all levels and government policy makers need to be better informed about the important contributions entrepreneurship and innovation play in assuring a healthy economy. To that end we are undertaking several programs to develop suitable reference materials documenting the contributions and processes of successful entrepreneurship.

Our initial program is to prepare and distribute an Annotated Bibliography on Entrepreneurship, Innovation and Invention - Its Role in Society. Initial distribution will be to 500 leading educators, libraries and government policy-makers.

We are looking for up to 10 sponsors to underwrite the $35,000 cost for this program. Sponsors of course, will receive copies of the resulting booklet.

I hope that we can look forward to receiving your personal support and that of the Dunkin Donuts organization.

Enclosed is a flyer describing our organization. If you would like more details on the Bibliography project please call to request a proposal outline.

IPRS was incorporated as a non-profit organization in the Commonwealth of Massachusetts, August 11th of this year. We are in the process of applying for an IRS tax exemption under Section 501(c)(3) so that deductions will be tax deductible.

Sincerely yours,

Donald D. Job
President

A Non-Profit Organization for Linking Science with Manufacturing

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439

October 12, 1987

Dr. Donald D. Job, President
Enbede Co.
24 Oxbow Road
Lexington, MA 02173

Dear Dr. Job:

I have just read with great interest your proposal for a Massachusetts Product Develpoment Center that you sent me. I find the idea quite worthy and innovative.

As you know, in the project we are doing for the U.S. DOE Energy Related Inventions Program, I have been studying the different organizations and programs throughout the country that assist the independent inventor. While there are many incubators for small businesses which could benefit an inventor trying to manufacture and sell his or her invention, I have found none focused on the inventor during the stages of the inventing as your proposed incubator would. Thus I think it would be a grand experiment, and if sucessful, as it seems it should be from your plans, will be a boon to inventors and the Commonwealth.

Our project here has a small amount of funding to assist inventor organizations do innovative activities. Your proposal certainly falls into our area of interest. At the point when you feel you have lined up sufficient funding and other resources that the probability of actually setting up the incubator is high, my DOE sponsors, you, and I should discuss how one of our grants could be used to both further your and our goals. Our goal would be to evaluate your succeess and learn if it is possible and worthwhile to transfer the concept to other places in the US.

In the meantime, please keep us informed of your progress. All I can offer at the present is moral support, which you have. Wishing you the best of luck in your endeavor.

Sincerely,

Martin J. Bernard III, Ph.D.
Energy and Environmental Systems Division

Inventors Association of New England

113 Wood End Lane
Medfield, MA 02052
August 8, 1988

Donald D. Job, Executive Director
Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173

Dear Dr. Job:

This letter is to confirm the action of the Executive Board of I.A.N.E. to express its wholehearted support of the concept and mission of IPRS. The contributions of the independent inventor to the economic health of our nation has been often overlooked and your efforts to document and publicize those contributions should be helpful for all inventors.

The process of invention development from concept to commercial success is a very complex one and often is poorly executed. By conducting research in this area and making that information available to inventors and manufacturers and the public alike there is great potential to lower the risks and therefore increase the investment in new technologies and products so that the U.S. will recapture it's leadership role in marketing competitive products throughout the world.

Sincerely yours,

Carl D. Hardy
President

Form **872-C**

(Rev. March 1986)

Department of the Treasury—Internal Revenue Service

Consent Fixing Period of Limitation Upon Assessment of Tax Under Section 4940 of the Internal Revenue Code

(See Form 1023 instructions for Part IV, line 3.)

OMB No. 1545-0056
Expires 3-31-89

To be used with Form 1023. Submit in duplicate.

Under section 6501(c)(4) of the Internal Revenue Code, and as part of a request filed with Form 1023 that the organization named below be treated as a publicly supported organization under section 170(b)(1)(A)(vi) or section 509(a)(2) during an advance ruling period,

Innovative Products Research and Services, Inc.
(Exact legal name of organization)

P.O. Box 335
Lexington, MA 02173
(Number, street, city or town, state, and ZIP code)

} and the District Director of Internal Revenue

Consent and agree that the period for assessing tax (imposed under section 4940 of the Code) for any of the 5 tax years in the advance ruling period will extend 8 years, 4 months, and 15 days beyond the end of the first tax year.

However, if a notice of deficiency in tax for any of these years is sent to the organization before the period expires, then the time for making an assessment will be further extended by the number of days the assessment is prohibited, plus 60 days.

Ending date of first tax year December 31, 1988

Name of organization	Date
Innovative Products Research and Services, Inc.	

Officer or trustee having authority to sign

Signature ▶

District Director	Date

By ▶

☆U.S. GPO 1985-463-673

Form **SS-4**
(Rev. 9-82)
Department of the Treasury
Internal Revenue Service

Application for Employer Identification Number

(For use by employers and others as explained in the instructions. Please read the instructions before completing this form.)

OMB No 1545-0003 Expires 9-30-85

1 Name (True name and not trade name. If partnership, see page 4.)
Innovative Products Research & Services, Inc.

2 Social security no., if sole proprietor

3 Ending month of accounting year
December

4 Trade name, if any, of business (if different from item 1)

5 General partner's name, if partnership; principal officer's name, if corporation; or grantor's name, if trust
Donald D. Job, President

6 Address of principal place of business (Number and street)
24 Oxbow Road

7 Mailing address, if different
P.O. Box 335, Lexington, MA 02173

8 City, State, and ZIP code
Lexington, MA 02173

9 County of principal business location
Middlesex

10 Type of organization
☐ Individual ☐ Trust ☐ Partnership ☐ Other (specify)
☐ Governmental ☒ Nonprofit organization ☐ Corporation

11 Date you acquired or started this business (Mo., day, year)
August 11, 1988

12 Reason for applying
☒ Started new business ☐ Purchased going business ☐ Other (specify)

13 First date you paid or will pay wages for this business (Mo., day, year)
January 1989

14 Nature of principal business activity (See instructions on page 4.)
Charitable Non-Profit for Scientific Research & Education

15 Do you operate more than one place of business? ☐ Yes ☒ No

16 Peak number of employees expected in next 12 months (If none, enter "0") ▶

Nonagricultural	Agricultural	Household
5	-0-	-0-

17 If nature of business is manufacturing, state principal product and raw material used.

18 To whom do you sell most of your products or services?
☐ Business establishments (wholesale) ☐ General public (retail) ☒ Other (specify) N/A

19 Have you ever applied for an identification number for this or any other business? ☒ Yes ☐ No
If "Yes," enter name and trade name. Also enter approx. date, city, and State where you applied and previous number if known. ▶
Home Software Specialists, February, 1984
Lexington, MA 540-423-943-02 Now Abandoned.

Under penalties of perjury, I declare that I have examined this application, and to the best of my knowledge and belief it is true, correct, and complete.
Signature and Title ▶ Donald D. Job, Pres. Date ▶ 11/16/88

Telephone number (include area code)
(617) 862-5008

Please leave blank ▶	Geo.	Ind.	Class	Size	Reas. for appl.	Part I

Your Letterhead

July 12, 1989

Dr. Donald D. Job
President
Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173

Dear Dr. Job:

I have reviewed the material you provided on IPRS and understand and endorse its mission to support strong manufacturing capabilities in America through research, education and communication of the factors and processes involved in effective technology transfer from laboratory to marketplace.

I believe your goals are worthy and attainable and will be of considerable public benefit. I am therefore pleased to accept your invitation to become a member of your Advisory Board. You may use my name and/or a copy of this letter in your efforts to obtain support for your organization.

In keeping with my role as advisor I will forward information on events in my industry to you as it comes to my attention and shall look forward to receiving materials which IPRS develops.

Sincerely yours,

Executive

July 12, 1989

General Sponsors

Associated Industries of Mass.
Boston, MA

Inventors Association of N.E.
Burlington, MA

Performance Concepts
Industrial Designers &
Space Planners
Medfield, MA

Enbede Co.
Product Developers
Lexington, MA

..&Name&
..&sponsor&

..Dear &Name&

You are part of a very select group to which a similar letter is being sent; so your response is most important to us. Wouldn't you like to have your company's name appearing among those who support innovation in meeting critical national needs for manufacturing competitiveness?

For a fraction of your current advertising budget you can receive regional and national publicity as a contributor to providing leadership in this important area.

As a General Sponsor, your company's name will appear on our letter head which will accompany news releases to regional and national media. It will also appear on information sheets provided to the trade and the public. Your sponsorship money will go towards defraying the costs of operations, communications (newsletters and information sheets) with manufacturers, innovators, educators, government officials and the public, writing associated publicity and promotional pieces, and preparing information for policy makers. Suggested minimum sponsorship fee is $5,000.

We discourage sponsorship by directly competing companies; so, you are encouraged to respond with your commitment at the earliest possible date (before your competitor does).

Sincerely yours,

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.

ADVISORY BOARD

CERTIFICATE OF PARTICIPATION

Is recognized for leadership in his profession and industry and his commitment to building a stronger manufacturing base in America through innovation and greater technology utilization.

Advisory Board members are in a position to provide counsel, contacts and referrals, industry specific information pertinent to IPRS objectives; and, to be advocates for programs and policies which will contribute to the success of U.S. manufacturers.

Members are entitled to receive the publications and reports of IPRS without charge.

_____ Date: _____

Donald D. Job, Ph.D.
President

ARTICLES OF INCORPORATION

FORM CD 180 Rev. 4-84. 20M-809221

Examiner

The Commonwealth of Massachusetts

Office of the Secretary of State
One Ashburton Place, Boston, MA 02108
Michael Joseph Connolly, Secretary

ARTICLES OF ORGANIZATION

(Under G.L. Ch. 180)

Incorporators

NAME	RESIDENCE
Include given name in full in case of natural persons; in case of a corporation, give state of incorporation.	
Donald D. Job	24 Oxbow Road Lexington, MA 02173
Harry C. King	406 Great Elm Way Acton, MA 01720

The above-named incorporator(s) do hereby associate (themselves) with the intention of forming a corporation under the provisions of General Laws, Chapter 180 and hereby state(s):

Name Approved

1. The name by which the corporation shall be known is:

   Innovative Products Research & Services, Inc.

2. The purposes for which the corporation is formed is as follows:

See page 2A attached hereto and made a part hereof.

C ☐
P ☐
M ☐
R.A. ☐

P.C.

Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on separate 8 1/2 x 11 sheets of paper leaving a left hand margin of at least 1 inch for binding. Additions to more than one article may be continued on a single sheet so long as each article requiring each such addition is clearly indicated.

2. The corporation is organized for the following educational, scientific and charitable purposes:

(a) to study and encourage the understanding of invention/innovation processes; and

(b) to conduct and encourage study, conferences, lectures and educational courses;

(c) to sponsor, develop and promote services and programs which address in an effective and efficient manner the needs of the scientific community;

(d) to promote and expand human knowledge in the field of science by directly engaging in the continuous active conduct of scientific and technological research by means of investigations, experiments, and studies within the associated disciplines spanning the sciences to discover, develop, verify or clarify scientific knowledge and understanding;

(e) to engage generally in any business which may lawfully be carried on by a corporation formed under Chapter 180 of the General Laws of Massachusetts and which is not inconsistent with the corporation's qualification as an organization described in section 501(c)(3) of the Internal Revenue Code of 1986, as amended.

3. If the corporation has more than one class of members, the designation of such classes, the manner of election or appointment, the duration of membership and the qualification and rights, including voting rights, of the members of each class, are as follows: -

Not applicable

*4. Other lawful provisions, if any, for the conduct and regulation of the business and affairs of the corporation, for its voluntary dissolution, or for limiting, defining, or regulating the powers of the corporation, or of its directors or members, or of any class of members, are as follows:-

See pages 4A through 4G attached hereto and made a part hereof.

*If there are no provisions state "None".

4. The corporation shall have the following powers in furtherance of its corporate purposes:

(a) The corporation shall have perpetual succession in its corporate name.

(b) The corporation may sue and be sued.

(c) The corporation may have a corporate seal which it may alter at pleasure.

(d) The corporation may elect or appoint directors, officers, employees and other agents, fix their compensation and define their duties and obligations.

(e) The corporation may purchase, receive or take by grant, gift, devise, bequest or otherwise, lease, or otherwise acquire, own, hold, improve, employ, use and otherwise deal in and with, real or personal property, or any interest therein, wherever situated, in an unlimited amount.

(f) The corporation may solicit and receive contributions from any and all sources and may receive and hold, in trust or otherwise, funds received by gift or bequest.

(g) The corporation may sell, convey, lease, exchange, transfer or otherwise dispose of, or mortgage, pledge, encumber or create a security interest in, all or any of its property, or any interest therein, wherever situated.

(h) The corporation may purchase, take, receive, subscribe for, or otherwise acquire, own, hold, vote, employ, sell, lend, lease, exchange, transfer, or otherwise dispose of, mortgage, pledge, use and otherwise deal in and with, bonds and other obligations, shares, or other securities or interests issued by others, whether engaged in similar or different business, governmental, or other activities.

(i) The corporation may make contracts, give guarantees and incur liabilities, borrow money at such rates of interest as the corporation may determine, issue its notes, bonds and other obligations, and secure any of its obligations by mortgage, pledge or encumbrance of, or security interest in, all or any of its property or any interest therein, wherever situated.

(j) The corporation may lend money, invest and reinvest its funds, and take and hold real and personal property as security for the payment of funds so loaned or invested.

(k) The corporation may do business, carry on its operations, and have offices and exercise the powers granted by Massachusetts General Laws, Chapter 180, in any jurisdiction within or without the United States, although the corporation shall not be operated for the primary purpose of carrying on for profit a trade or business unrelated to its tax exempt purposes.

(l) The corporation may pay pensions, establish and carry out pension, savings, thrift and other retirement and benefit plans, trusts and provisions for any or all of its directors, officers and employees.

(m) The corporation may make donations in such amounts as the members or directors shall determine, irrespective of corporate benefit, for the public welfare or for community fund, hospital, charitable, religious, educational, scientific, civic or similar purposes, and in time of war or other national emergency in aid thereof; provided that, as long as the corporation is entitled to exemption from federal income tax under Section 501(c)(3) of the Internal Revenue Code, it shall make no contribution for other than religious, charitable, scientific, testing for public safety, literary, or educational purposes or for the prevention of cruelty to children or animals.

(n) The corporation may be an incorporator of other corporations of any type or kind.

(o) The corporation may be a partner in any business enterprise which it would have power to conduct by itself.

(p) The directors may make, amend or repeal the by-laws in whole or in part, except with respect to any provision thereof which by law or the by-laws requires action by the members.

(q) Meetings of the members may be held anywhere in the United States.

(r) The corporation shall, to the extent legally permissible and only to the extent that the status of the corporation as an organization exempt under Section 501(c)(3) of the Internal Revenue Code is not affected thereby, indemnify each of its directors and officers (including persons who serve at its request as directors, officers or trustees of another organization in which it has an interest) against all liabilities and expenses, including

amounts paid in satisfaction of judgments, in compromise or as fines and penalties, and counsel fees, reasonably incurred by him in connection with the defense or disposition of any action, suit or other proceeding, whether civil or criminal, in which he may be involved or with which he may be threatened, while in office or thereafter, by reason of his being or having been such a director or officer, except with respect to any matter as to which he shall have been adjudicated in any proceeding not to have acted in good faith in the reasonable belief that his action was in the best interests of the corporation; provided, however, that as to any matter disposed of by a compromise payment by such director or officer, pursuant to a consent decree or otherwise, no indemnification either for said payment or for any other expenses shall be provided unless such compromise shall be approved as in the best interests of the corporation, after notice that it involves such indemnification: (a) by a disinterested majority of the directors then in office; or (b) by a majority of the disinterested directors then in office, provided that there has been obtained an opinion in writing of independent legal counsel to the effect that such director or officer appears to have acted in good faith in the reasonable belief that his action was in the best interests of the corporation; or (c) by a majority of the disinterested members entitled to vote, voting as a single class. Expenses, including counsel fees, reasonably incurred by any such director or officer in connection with the defense or disposition of any such action, suit or other proceeding may be paid from time to time by the corporation in advance of the final disposition thereof upon receipt of an undertaking by such director or officer to repay the amounts so paid to the corporation if it is ultimately determined that indemnification is not authorized hereunder. The right of indemnification hereby provided shall not be exclusive of or affect any other rights to which any director or officer may be entitled. Nothing contained herein shall affect any rights to indemnification to which corporate personnel other than directors or officers may be entitled by contract or otherwise under law. As used in this paragraph, the terms "directors" and "officers" include their respective heirs, executors and administrators, and an "interested" director or member is one against whom in such capacity the proceeding in question or another proceeding on the same or similar grounds is then pending.

No director or officer of this corporation shall be liable to the corporation or its member or members for monetary damages for breach of fiduciary duty as a director or officer, except to the extent such exemption from liability or limitation thereof is not permitted under the

Massachusetts General Laws as the same exist or may hereafter be amended.

(s) No person shall be disqualified from holding any office by reason of any interest. In the absence of fraud, any director, officer, or member of this corporation individually, or any individual having any interest in any concern in which any such directors, officers, members, or individuals have any interest, may be a party to, or may be pecuniarily or otherwise interested in, any contract, transaction, or other act of this corporation, and

(1) such contract, transaction, or act shall not be in any way invalidated or otherwise affected by that fact;

(2) no such director, officer, member, or individual shall be liable to account to this corporation for any profit or benefit realized through any such contract, transaction, or act; and

(3) any such director of this corporation may be counted in determining the existence of a quorum at any meeting of the directors or of any committee thereof which shall authorize any such contract, transaction, or act, and may vote to authorize the same;

provided, however, that any contract, transaction or act in which any director or officer of this corporation is so interested individually or as a director, officer, trustee or member of any concern which is not a subsidiary or affiliate of this corporation, or in which any directors or officers are so interested as holders, collectively, of a majority of shares of capital stock or other beneficial interest at the time outstanding in any concern which is not a subsidiary or affiliate of this corporation, shall be duly authorized or ratified by a majority of the directors who are not so interested and to whom the nature of such interest has been disclosed and who have made any findings required by law:

the term "interest" including personal interest and interest as a director, officer, stockholder, shareholder, trustee, member or beneficiary of any concern;

the term "concern" meaning any corporation, association, trust, partnership, firm, person or other entity other than this corporation; and

the phrase "subsidiary or affiliate" meaning a concern in which a majority of the directors,

trustees, partners or controlling persons is elected or appointed by the directors of this corporation, or is constituted of the directors or officers of this corporation.

To the extent permitted by law, the authorizing or ratifying vote of a majority of each class of members of this corporation entitled to vote for directors at any annual meeting or a special meeting duly called for the purpose (whether such vote is passed before or after judgment rendered in a suit with respect to such contract, transaction or act) shall validate any contract, transaction or act of this corporation, or of the board of directors or any committee thereof, with regard to all members of this corporation, whether or not members at the time of such vote, and with regard to all creditors and other claimants under this corporation; provided, however, that

A. with respect to the authorization or ratification of contracts, transactions or acts in which any of the directors, officers or members of this corporation have an interest, the nature of such contracts, transactions or acts and the interest of any director, officer or member therein shall be summarized in the notice of any such annual or special meeting, or in a statement or letter accompanying such notice, and shall be fully disclosed at any such meeting;

B. the members so voting shall have made any findings required by law;

C. members so interested may vote at any such meeting except to the extent otherwise provided by law; and

D. any failure of the members to authorize or ratify such contract, transaction or act shall not be deemed in any way to invalidate the same or to deprive this corporation, or its directors, officers or employees of its or their right to proceed with such contract, transaction or act.

No contract, transaction or act shall be avoided by reason of any provision or provisions of this paragraph (s) which would be valid but for such provision or provisions.

(t) No part of the assets of the corporation and no part of any net earnings of the corporation shall be divided among or inure to the benefit of any officer or director of the corporation or any private individual or be appropriated for any purposes other than the purposes of the corporation

as herein set forth; and no substantial part of the activities of the corporation shall be the carrying on of propaganda, or otherwise attempting, to influence legislation except to the extent that the corporation makes expenditures for purposes of influencing legislation in conformity with the requirements of Section 501(h) of the Internal Revenue Code; and the corporation shall not participate in, or intervene in (including the publishing or distributing of statements), any political campaign on behalf of any candidate for public office. It is intended that the corporation shall be entitled to exemption from federal income tax under Section 501(c)(3) of the Internal Revenue Code and shall not be a private foundation under Section 509(a) of the Internal Revenue Code.

(u) Upon the liquidation or dissolution of the corporation, after payment of all of the liabilities of the corporation or due provision therefor, all of the assets of the corporation shall be disposed of to one or more organizations exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code.

(v) In the event that the corporation is a private foundation as that term is defined in Section 509 of the Internal Revenue Code, then notwithstanding any other provisions of the articles of organization or the by-laws of the corporation, the following provisions shall apply:

> The directors shall distribute the income for each taxable year at such time and in such manner as not to become subject to the tax on undistributed income imposed by Section 4942 of the Internal Revenue Code.
>
> The directors shall not engage in any act of self dealing as defined in Section 4941(d) of the Internal Revenue Code; nor retain any excess business holdings as defined in Section 4943(c) of the Internal Revenue Code; nor make any investments in such manner as to incur tax liability under Section 4944 of the Internal Revenue Code; nor make any taxable expenditures as defined in Section 4945(d) of the Internal Revenue Code.

(w) The corporation shall have and may exercise all powers necessary or convenient to effect any or all of the purposes for which the corporation is formed; provided, however, that no such power shall be exercised in a manner inconsistent with Massachusetts General Laws, Chapter 180 or any other chapter of the General Laws of The Commonwealth of Massachusetts; and provided, further, that the corporation shall not engage in any activity or exercise any power which

would deprive it of any exemption from federal income tax which the corporation may receive under Section 501(c)(3) of the Internal Revenue Code.

(x) All references herein: (i) to the Internal Revenue Code shall be deemed to refer to the Internal Revenue Code of 1986, as now in force or hereafter amended; (ii) to the General Laws of The Commonwealth of Massachusetts, or any chapter thereof, shall be deemed to refer to said General Laws or chapter as now in force or hereafter amended; and (iii) to particular sections of the Internal Revenue Code or the General Laws of The Commonwealth of Massachusetts shall be deemed to refer to similar or successor provisions hereafter adopted.

5. By-laws of the corporation have been duly adopted and the initial directors, president, treasurer ~~and clerk or other~~ presiding, financial or recording officers whose names are set out below, have been duly elected.

6. The effective date of organization of the corporation shall be the date of filing with the Secretary of the Commonwealth or if later date is desired, specify date, (not more than 30 days after date of filing).

7. The following information shall not for any purpose be treated as a permanent part of the Articles of Organization of the corporation.

   a. The post office address of the initial principal office of the corporation in Massachusetts is:

   P.O. Box 335, Lexington, Massachusetts 02173

   b. The name, residence, and post office address of each of the initial directors and following officers of the corporation are as follows:

	NAME	RESIDENCE	POST OFFICE ADDRESS
President:	Donald D. Job	24 Oxbow Rd. Lexington, MA 02173	P.O. Box 335 Lexington, MA 02173
Treasurer:	Donald D. Job	24 Oxbow Rd. Lexington, MA 02173	P.O. Box 335 Lexington, MA 02173
Clerk:	Harry C. King	406 Great Elm Way Acton, MA 01720	
Directors: (or officers having the powers of directors)			
	Donald D. Job, Harry C. King Carl Hardy	113 Wood End Lane Medfield, MA 02052	P.O. Box 335 Lexington, MA 02173
	James E. Lyddy	122 Claremont Avenue Arlington, MA 02174	P.O. Box 335 Lexington, MA 02173

   c. The date initially adopted on which the corporation's fiscal year ends is:

   December 31

   d. The date initially fixed in the by-laws for the annual meeting of members of the corporation is:

   the second Wednesday in March

   e. The name and business address of the resident agent, if any, of the corporation is:

   N/A

IN WITNESS WHEREOF, and under the penalties of perjury the INCORPORATOR(S) sign(s) these Articles of Organization this 4th day of August, 1988

I/We the below signed INCORPORATORS do hereby certify under the pains and penalties of perjury that I/We have not been convicted of any crimes relating to alcohol or gaming within the past ten years; I/We do hereby further certify that to the best of my/our knowledge the above named principal officers have not been similarly convicted. If so convicted, explain.

Donald D. Job .....

Harry C. King .....

.....

The signature of each incorporator which is not a natural person must be by an individual who shall show the capacity in which he acts and by signing shall represent under the penalties of perjury that he is duly authorized on its behalf to sign these Articles of Organization.

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF ORGANIZATION
GENERAL LAWS, CHAPTER 180

I hereby certify that, upon an examination of the within-written articles of organization, duly submitted to me, it appears that the provisions of the General Laws relative to the organization of corporations have been complied with, and I hereby approve said articles; and the filing fee in the amount of $30.00 having been paid, said articles are deemed to have been filed with me this day of 19

Effective date

MICHAEL JOSEPH CONNOLLY
Secretary of State

TO BE FILLED IN BY CORPORATION
PHOTO COPY OF ARTICLES OF ORGANIZATION TO BE SENT

TO:
Carolyn M. Osteen, Esq.
Ropes & Gray
225 Franklin Street
Boston, MA 02110
Telephone (617) 423-6100

Filing Fee $30.00

Copy Mailed

CORPORATE BYLAWS

BY-LAWS

OF

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.

Section 1. NAME, PURPOSES, LOCATION, CORPORATE SEAL AND FISCAL YEAR

1.1. Name and Purposes. The name and purposes of the corporation shall be as set forth in the articles of organization.

1.2. Location. The principal office of the corporation in The Commonwealth of Massachusetts shall initially be located at the place set forth in the articles of organization of the corporation. The directors may change the location of the principal office in The Commonwealth of Massachusetts effective upon filing a certificate with the Secretary of the Commonwealth.

1.3. Corporate Seal. The directors may adopt and alter the seal of the corporation.

1.4. Fiscal Year. The fiscal year of the corporation shall, unless otherwise decided by the directors, end on December 31 in each year.

Section 2. MEMBERS

2.1. Number, Election and Qualification. The incorporator(s) at their initial meeting and thereafter the members annually at their annual meeting shall fix the number of members and shall elect the number of members so fixed. At any special or regular meeting the members may increase the number of members and elect new members to complete the number so fixed by a vote of a majority of the members then in office; or they may decrease the number of members, but only to eliminate vacancies caused by the death, resignation, removal or disqualification of one or more members. Unless the members otherwise designate, there shall be no qualifications for members. No such designation shall disqualify a member in office when the designation is made.

2.2. Tenure. Each member shall hold office until the next annual meeting of members and until his successor is elected and qualified, or until he sooner dies, resigns, is removed or becomes disqualified.

2.3. Powers and Rights. In addition to the right to elect directors as provided in Section 4.1 and such other powers and rights as are vested in them by law, the articles of organization or these by-laws, the members shall have such other powers and rights as the directors may designate.

2.4. Suspension or Removal. A member may be suspended or removed with or without cause by vote of a majority of the members then in office. A member may be removed for cause only after reasonable notice and opportunity to be heard.

2.5. Resignation. A member may resign by delivering his written resignation to the president, treasurer or clerk of the corporation, to a meeting of the members or directors or to the corporation at its principal office. Such resignation shall be effective upon receipt (unless specified to be effective at some other time), and acceptance thereof shall not be necessary to make it effective unless it so states.

2.6. Vacancies. Any vacancy in the membership, except a vacancy resulting from enlargement (which must be filled in accordance with Section 2.1), may be filled by the members. Each successor shall hold office for the unexpired term or until he sooner dies, resigns, is removed or becomes disqualified. The members shall have and may exercise all their powers notwithstanding the existence of one or more vacancies in their number.

2.7. Annual Meeting. The annual meeting of the members shall be held at 7:00 p.m. on the second Wednesday in March each year or if that date is a legal holiday in the place where the meeting is to be held, then at the same hour on the next succeeding day not a legal holiday. The annual meeting may be held at the principal office of the corporation or at such other place within the United States as the president, members or directors shall determine. No change in the date fixed in these by-laws for the annual meeting shall be made within sixty days before the date stated herein. Notice of any change of the date fixed in these by-laws for the annual meeting shall be given to all members at least twenty days before the new date fixed for such meeting.

If an annual meeting is not held as herein provided, a special meeting of the members may be held in place thereof with the same force and effect as the annual meeting, and in such case all references in these by-laws, except in this Section 2.7, to the annual meeting of the members shall be deemed to refer to such special meeting. Any such special meeting shall be called and notice shall be given as provided in Sections 2.9 and 2.10.

2.8. Regular Meetings. Regular meetings of the members may be held at such places within the United States and at such times as the members may determine.

2.9. Special Meetings. Special meetings of the members may be held at any time and at any place within the United States. Special meetings of the members may be called by the president or by the directors, and shall be called by the clerk, or in the case of the death, absence, incapacity or refusal of the clerk, by any other officer, upon written application of three or more members.

2.10. Call and Notice.

(a) Annual and Regular Meetings. No call or notice shall be required for annual or regular meetings of members, provided that reasonable notice (i) of the first regular meeting following the determination by the members of the times and places for regular meetings shall be given to absent members, (ii) of an annual meeting not held at the principal office of the corporation shall be given to each member, (iii) specifying the purpose of an annual or regular meeting shall be given to each member if there is to be considered at the meeting contracts or transactions of the corporation with interested persons, amendments to these by-laws (as adopted by the directors or otherwise) or removal or suspension of a member or director and (iv) shall be given as otherwise required by law, the articles of organization or these by-laws (including Section 2.7).

(b) Special Meetings. Reasonable notice of the time and place of special meetings of the members shall be given to each member. Such notice need not specify the purposes of a meeting, unless otherwise required by law, the articles of organization or these by-laws or unless there is to be considered at the meeting (i) contracts or transactions of the corporation with interested persons, (ii) amendments to these by-laws (as adopted by the directors or otherwise), (iii) an increase or decrease in the number of members or directors, or (iv) removal or suspension of a member or director.

(c) Sufficient Notice. Except as otherwise expressly provided, it shall be sufficient notice to a member to send notice by mail at least five business days before the meeting addressed to him at his usual or last known business or residence address or to give notice to him in person or by telephone at least twenty-four hours before the meeting.

(d) Waiver of Notice. Whenever notice of a meeting is required, such notice need not be given to any member if a written waiver of notice, executed by him (or his attorney

thereunto authorized) before or after the meeting, is filed with the records of the meeting. A waiver of notice need not specify the purposes of the meeting unless such purposes were required to be specified in the notice of such meeting.

2.11. Quorum. At any meeting of the members a majority of the members then in office (whether present in person or duly represented) shall constitute a quorum. Any meeting may be adjourned to such date or dates not more than 90 days after the first session of the meeting by a majority of the votes cast upon the question, whether or not a quorum is present, and the meeting may be held as adjourned without further notice.

2.12. Action by Vote. Each member shall have one vote. When a quorum is present at any meeting, a majority of the votes properly cast by members present in person or duly represented shall decide any question, including election to any office, unless otherwise provided by law, the articles of organization or these by-laws.

2.13. Action by Writing. Any action required or permitted to be taken at any meeting of the members may be taken without a meeting if all members entitled to vote on the matter consent to the action in writing and the written consents are filed with the records of the meetings of the members. Such consents shall be treated for all purposes as a vote at a meeting.

2.14. Presence Through Communications Equipment. Unless otherwise provided by law or the articles of organization, the members may participate in a meeting of the members by means of a conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other at the same time and participation by such means shall constitute presence in person at a meeting.

2.15. Proxies. Members may vote either in person or by written proxy dated not more than six months before the meeting named therein, which proxies shall be filed before being voted with the clerk or other person responsible for recording the proceedings of the meeting. Unless otherwise specifically limited by their terms, such proxies shall entitle the holders thereof to vote at any adjournment of the meeting but the proxy shall terminate after the final adjournment of such meeting.

2.16. Compensation. Members shall be entitled to receive for their services such amount, if any, as the directors may determine, which may include expenses of attendance at meetings. Members shall not be precluded from

serving the corporation in any other capacity and receiving compensation for any such services.

Section 3. SPONSORS, BENEFACTORS, CONTRIBUTORS, ADVISERS, FRIENDS OF THE CORPORATION

The directors may designate certain persons or groups of persons as sponsors, benefactors, contributors, advisers or friends of the corporation or such other title as they deem appropriate. Such persons shall serve in an honorary capacity and, except as the directors shall otherwise designate, shall in such capacity have no right to notice of or to vote at any meeting, shall not be considered for purposes of establishing a quorum, and shall have no other rights or responsibilities.

Section 4. BOARD OF DIRECTORS

4.1. Number and Election. The members annually at their annual meeting shall fix the number of directors and shall elect the number of directors so fixed. At any special or regular meeting the members or directors may increase the number of directors and elect new directors to complete the number so fixed by a vote of a majority of the members or directors then in office, as the case may be; or they may decrease the number of directors, but only to eliminate vacancies existing by reason of the death, resignation, removal or disqualification of one or more directors. A director may but need not be a member.

4.2. Tenure. Each director shall hold office until the next annual meeting of members and until his successor is elected and qualified, or until he sooner dies, resigns, is removed or becomes disqualified.

4.3. Powers. The affairs of the corporation shall be managed by the directors who shall have and may exercise all the powers of the corporation, except those powers reserved to the members by law, the articles of organization or these by-laws.

4.4. Committees. The directors may elect or appoint one or more committees and may delegate to any such committee or committees any or all of their powers. Any committee to which the powers of the directors are delegated shall consist solely of directors. Unless the directors otherwise designate, committees shall conduct their affairs in the same manner as is provided in these by-laws for the directors. The members of any committee shall remain in office at the pleasure of the directors.

4.5. Suspension or Removal. A director may be suspended or removed (a) with or without cause by vote of a majority of the members then in office or (b) with cause by vote of a majority of the directors then in office. A director may be removed with cause only after reasonable notice and opportunity to be heard.

4.6. Resignation. A director may resign by delivering his written resignation to the president, treasurer or clerk of the corporation, to a meeting of the members or directors or to the corporation at its principal office. Such resignation shall be effective upon receipt (unless specified to be effective at some other time) and acceptance thereof shall not be necessary to make it effective unless it so states.

4.7. Vacancies. Any vacancy in the board of directors, except a vacancy resulting from enlargement (which must be filled in accordance with Section 4.1), may be filled by the members or directors. Each successor shall hold office for the unexpired term or until he sooner dies, resigns, is removed or becomes disqualified. The directors shall have and may exercise all their powers notwithstanding the existence of one or more vacancies in their number.

4.8. Regular Meetings. Regular meetings of the directors may be held at such places and at such times as the directors may determine.

4.9. Special Meetings. Special meetings of the directors may be held at any time and at any place when called by the chairman of the board of directors (or if there be no such chairman, the president) or by two or more directors.

4.10. Call and Notice.

(a) Regular Meetings. No call or notice shall be required for regular meetings of directors, provided that reasonable notice (i) of the first regular meeting following the determination by the directors of the times and places for regular meetings shall be given to absent members, (ii) specifying the purpose of a regular meeting shall be given to each director if there are to be considered at the meeting contracts or transactions of the corporation with interested persons, amendments to these by-laws or removal or suspension of a director and (iii) shall be given as otherwise required by law, the articles of organization or these by-laws.

(b) Special Meetings. Reasonable notice of the time and place of special meetings of the directors shall be

given to each director. Such notice need not specify the purposes of a meeting, unless otherwise required by law, the articles of organization or these by-laws or unless there is to be considered at the meeting (i) contracts or transactions of the corporation with interested persons, (ii) amendments to these by-laws, (iii) an increase or decrease in the number of directors, or (iv) removal or suspension of a director.

(c) Sufficient Notice. Except as otherwise expressly provided, it shall be sufficient notice to a director to send notice by mail at least forty-eight hours or by telegram at least twenty-four hours before the meeting addressed to him at his usual or last known business or residence address or to give notice to him in person or by telephone at least twenty-four hours before the meeting.

(d) Waiver of Notice. Whenever notice of a meeting is required, such notice need not be given to any director if a written waiver of notice, executed by him (or his attorney thereunto authorized) before or after the meeting, is filed with the records of the meeting, or to any director who attends the meeting without protesting prior thereto or at its commencement the lack of notice to him. A waiver of notice need not specify the purposes of the meeting unless such purposes were required to be specified in the notice of such meeting.

4.11. Quorum. At any meeting of the directors a majority of the directors then in office shall constitute a quorum. Any meeting may be adjourned by a majority of the votes cast upon the question, whether or not a quorum is present, and the meeting may be held as adjourned without further notice.

4.12. Action by Vote. When a quorum is present at any meeting, a majority of the directors present and voting shall decide any question, including election of officers, unless otherwise provided by law, the articles of organization, or these by-laws.

4.13. Action by Writing. Any action required or permitted to be taken at any meeting of the directors may be taken without a meeting if all the directors consent to the action in writing and the written consents are filed with the records of the meetings of the directors. Such consents shall be treated for all purposes as a vote at a meeting.

4.14. Presence Through Communications Equipment. Unless otherwise provided by law or the articles of organization, members of the board of directors may participate in a meeting of such board by means of a

conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other at the same time and participation by such means shall constitute presence in person at a meeting.

4.15. Compensation. Directors shall be entitled to receive for their services such amount, if any, as the directors may from time to time determine, which may include expenses of attendance at meetings. Directors shall not be precluded from serving the corporation in any other capacity and receiving compensation for any such services.

Section 5. OFFICERS AND AGENTS

5.1. Number and Qualification. The officers of the corporation shall be a president, treasurer, clerk and such other officers, if any, as the directors may determine. The corporation may also have such agents, if any, as the directors may appoint. An officer may but need not be a director or member. The clerk shall be a resident of Massachusetts unless the corporation has a resident agent duly appointed for the purpose of service of process. A person may hold more than one office at the same time. If required by the directors, any officer shall give the corporation a bond for the faithful performance of his duties in such amount and with such surety or sureties as shall be satisfactory to the directors.

5.2. Election. The president, treasurer and clerk shall be elected annually by the directors at their first meeting following the annual meeting of the members. Other officers, if any, may be elected by the directors at any time.

5.3. Tenure. The president, treasurer and clerk shall each hold office until the first meeting of the directors following the next annual meeting of the members and until his successor is chosen and qualified, and each other officer shall hold office until the first meeting of the directors following the next annual meeting of the members unless a shorter period shall have been specified by the terms of his election or appointment, or in each case until he sooner dies, resigns, is removed or becomes disqualified. Each agent shall retain his authority at the pleasure of the directors.

5.4. Chairman of the Board of Directors. If a chairman of the board of directors is elected, he shall preside at all meetings of the directors, except as the directors shall otherwise determine, and shall have such other powers and duties as may be determined by the directors.

5.5. President and Vice Presidents. The president shall be the chief executive officer of the corporation and, subject to the control of the directors, shall have general charge and supervision of the affairs of the corporation. The president shall preside at all meetings of the members and, if no chairman of the board of directors is elected, at all meetings of the directors, except as the members or directors otherwise determine.

The vice president or vice presidents, if any, shall have such duties and powers as the directors shall determine. The vice president, or first vice president if there are more than one, shall have and may exercise all the powers and duties of the president during the absence of the president or in the event of his inability to act.

5.6. Treasurer. The treasurer shall be the chief financial officer and the chief accounting officer of the corporation. He shall be in charge of its financial affairs, funds, securities and valuable papers and shall keep full and accurate records thereof. He shall have such other duties and powers as designated by the directors or the president. He shall also be in charge of its books of account and accounting records, and of its accounting procedures.

5.7. Clerk. The clerk shall record and maintain records of all proceedings of the members and directors in a book or series of books kept for that purpose, which book or books shall be kept within the Commonwealth at the principal office of the corporation or at the office of its clerk or of its resident agent and shall be open at all reasonable times to the inspection of any member. Such book or books shall also contain records of all meetings of incorporators and the original, or attested copies, of the articles of organization and by-laws and names of all members and directors and the address of each. If the clerk is absent from any meeting of members or directors, a temporary clerk chosen at the meeting shall exercise the duties of the clerk at the meeting.

5.8. Suspension or Removal. An officer may be suspended or removed with or without cause by vote of a majority of directors then in office. An officer may be removed with cause only after reasonable notice and opportunity to be heard.

5.9. Resignation. An officer may resign by delivering his written resignation to the president, treasurer or clerk of the corporation, to a meeting of the members or directors, or to the corporation at its principal office. Such resignation shall be effective upon receipt (unless

specified to be effective at some other time), and acceptance thereof shall not be necessary to make it effective unless it so states.

5.10. Vacancies. If the office of any officer becomes vacant, the directors may elect a successor. Each such successor shall hold office for the unexpired term, and in the case of the president, treasurer and clerk until his successor is elected and qualified, or in each case until he sooner dies, resigns, is removed or becomes disqualified.

Section 6. EXECUTION OF PAPERS

Except as the directors may generally or in particular cases authorize the execution thereof in some other manner, all deeds, leases, transfers, contracts, bonds, notes, checks, drafts and other obligations made, accepted or endorsed by the corporation shall be signed by the president or by the treasurer.

Any recordable instrument purporting to affect an interest in real estate, executed in the name of the corporation by two of its officers, of whom one is the president or a vice president and the other is the treasurer or an assistant treasurer, shall be binding on the corporation in favor of a purchaser or other person relying in good faith on such instrument notwithstanding any inconsistent provisions of the articles of organization, by-laws, resolutions or votes of the corporation.

Section 7. PERSONAL LIABILITY

The members, directors and officers of the corporation shall not be personally liable for any debt, liability or obligation of the corporation. All persons, corporations or other entities extending credit to, contracting with, or having any claim against, the corporation, may look only to the funds and property of the corporation for the payment of any such contract or claim, or for the payment of any debt, damages, judgment or decree, or of any money that may otherwise become due or payable to them from the corporation.

Section 8. AMENDMENTS

These by-laws may be altered, amended or repealed in whole or in part by vote of a majority of the directors then in office, except with respect to any provision thereof which by law, the articles of organization or these by-laws requires action by the members. Not later than the time of giving notice of the meeting of members next following the amending or repealing by the directors of any by-laws,

notice thereof stating the substance of such change shall be given to all members. The members may alter, amend or repeal any by-laws adopted by the directors or otherwise, or adopt, alter, amend or repeal any provision which by law, the articles of organization or these by-laws requires action by the members.

Innovative Products Research and Services, Inc.

Action By Consent of Incorporator

The undersigned, Donald D. Job and Harry C. King, intending to act as incorporators and to form a corporation under Chapter 180 of the Massachusetts General Laws (the "Corporation"), hereby consent to the following action and adopt the following votes, in lieu of the first meeting of incorporators:

VOTED: That the bylaws attached hereto be and hereby are adopted as the bylaws of the corporation.

VOTED: That the number of members and directors of the corporation until changed in accordance with the bylaws, be and hereby is fixed at three, and that the following named persons be and hereby are elected directors of the corporation to hold office in accordance with the bylaws:

Donald D. Job
Harry C. King
Carl Hardy
James E. Lyddy

VOTED: That the following named persons be and hereby are elected to the office set forth opposite their respective names to hold office in accordance with the bylaws:

President	Donald D. Job
Treasurer	Donald D. Job
Clerk	Harry C. King

VOTED: That the post office address of the initial principal office of the Corporation in the Commonwealth of Massachusetts, until changed in accordance with the bylaws, be and hereby is designated as P.O. Box 335, Lexington, Massachusetts 02173.

VOTED: That the articles of organization of the Corporation attached hereto be and hereby are adopted as the articles of organization of the Corporation, and that the articles of organization be submitted to the Secretary of the Commonwealth of Massachusetts for his approval and filing.

IN WITNESS WHEREOF, this consent has been executed and filed with the records of the Corporation, and shall be treated for all purposes as votes taken at a meeting.

Donald D. Job

Dated: 8-4-88

Harry C. King

Dated: 8-4-88

STATE EXEMPTION

The Commonwealth of Massachusetts
Department of Revenue
Leverett Saltonstall Building
100 Cambridge Street, Boston 02204

STEPHEN W. KIDDER
COMMISSIONER
AUGUSTINE V. RANCATORE
CHIEF OF BUREAU

Innovative Products Research
And Services, Inc.
P. O. Box 335
Lexington, MA 02173

DATE: October 3, 1989

FID: 222938424

ORGANIZATION DATE: August 12, 1988

RE: APPROVAL

Dear Taxpayer:

Our records indicate that the above-named corporation was organized pursuant to Massachusetts General Laws, Chapter 180 as a non-profit, domestic corporation.

The above-named corporation has been approved to be exempt from Massachusetts corporate excise tax under the provisions of Massachusetts General Laws, Chapter 63, Section 30, subsection 1, and is therefore not required to file Form 355A, Domestic Business or Manufacturing Corporation Excise Return.

Very truly yours,
Determination Bureau
Non-Profit Corporation Unit
(617)727-2501 or (617) 727-2523

Form NP-4

CHARITABLE FUND RAISER APPLICATION

SCHEDULE A

Application for Solicitation Certificate

(TO BE COMPLETED BY ORGANIZATIONS WHO ANSWER "YES" TO EITHER QUESTION 19 OR QUESTION 20 UNLESS CLAIMING EXEMPTION UNDER QUESTION 21. ORGANIZATIONS COMPLETING SCHEDULE A MUST PAY THE $10.00 FILING FEE FOR THE SOLICITATION CERTIFICATE IN ADDITION TO THE $25.00 FILING FEE DUE WITH THE ANNUAL REPORT.)

1. Describe the methods to be used by the organization in soliciting funds: e.g., "coin collection containers," "sale of merchandise," "benefits," or "concerts," etc._____

2. If the organization will use a different name than the official name listed on Page 1 in connection with its solicitation, OR if it will use the name of any other organization in addition to its own name, list all such names:_____

3A. Did your organization retain a professional fund-raising counsel or professional solicitor during the fiscal year covered by this Form PC?
/___/YES /___/NO

3B. Will your organization retain a professional fund-raising counsel or professional solicitor during the coming fiscal year?
/___/YES /___/NO

3C. If you answered "YES" to either 3A or 3B, please provide the following information about each fund-raiser. (Attach schedule if more than one fund-raiser retained.)

NAME AND ADDRESS	DATE RETAINED	DATE TERMINATED	FUND-RAISER HANDLES RECEIPTS
			/___/ YES /___/ NO

NOTE: ALL PROFESSIONAL FUND-RAISERS MUST BE REGISTERED WITH THE DIVISION OF PUBLIC CHARITIES PRIOR TO COMMENCING FUND-RAISING ACTIVITIES.

4. Did your organization solicit contributions during the fiscal year covered by this Form PC by means of telephone operators whose principal duty was to solicit contributions?
/___/ YES /___/ NO
If YES, were the telephone operators paid for their service?
/___/ YES /___/ NO

5. Was a portion of expenses for wages, salaries, and fringe benefits allocated to the fund-raising function for the fiscal year covered by this Form PC?
/___/ YES /___/ NO
If NO, please explain_____

6. State the cost of any programs (for example, education) whose costs were incurred during the fiscal year covered by this Form PC and have not been allocated to fund-raising expense, but which include an appeal for contributions. $_____

7. Did your organization hold a raffle, bazaar, Las Vegas Night, beano, bingo, or similar gambling activity during the fiscal/calendar year?
/___/ YES /___/ NO
If YES, please attach a statement. (See instructions).

8. Has your organization entered into any commercial ventures with other parties to raise funds? /___/ YES /___/ NO
If YES, please explain:_____

SOLICITATION BOOKLET & NARRATIVE

AMERICAN MANUFACTURERS ARE LOSING THEIR HISTORIC LEAD IN NEW TECHNOLOGY & NEW PRODUCT INTRODUCTIONS

WHAT THIS COUNTRY NEEDS IS:

MORE LEADERS WHO ARE

INNOVATIVE, COMPETENT, & COMMITTED

WHO IS IPRS?

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC. IS:

* A 501 (C)(3) non-profit corporation of Massachusetts chartered to provide assistance in introducing new technologies to society.

* A qualified recipient of tax deductible contributions from private individuals and foundations.

THE MISSION OF IPRS

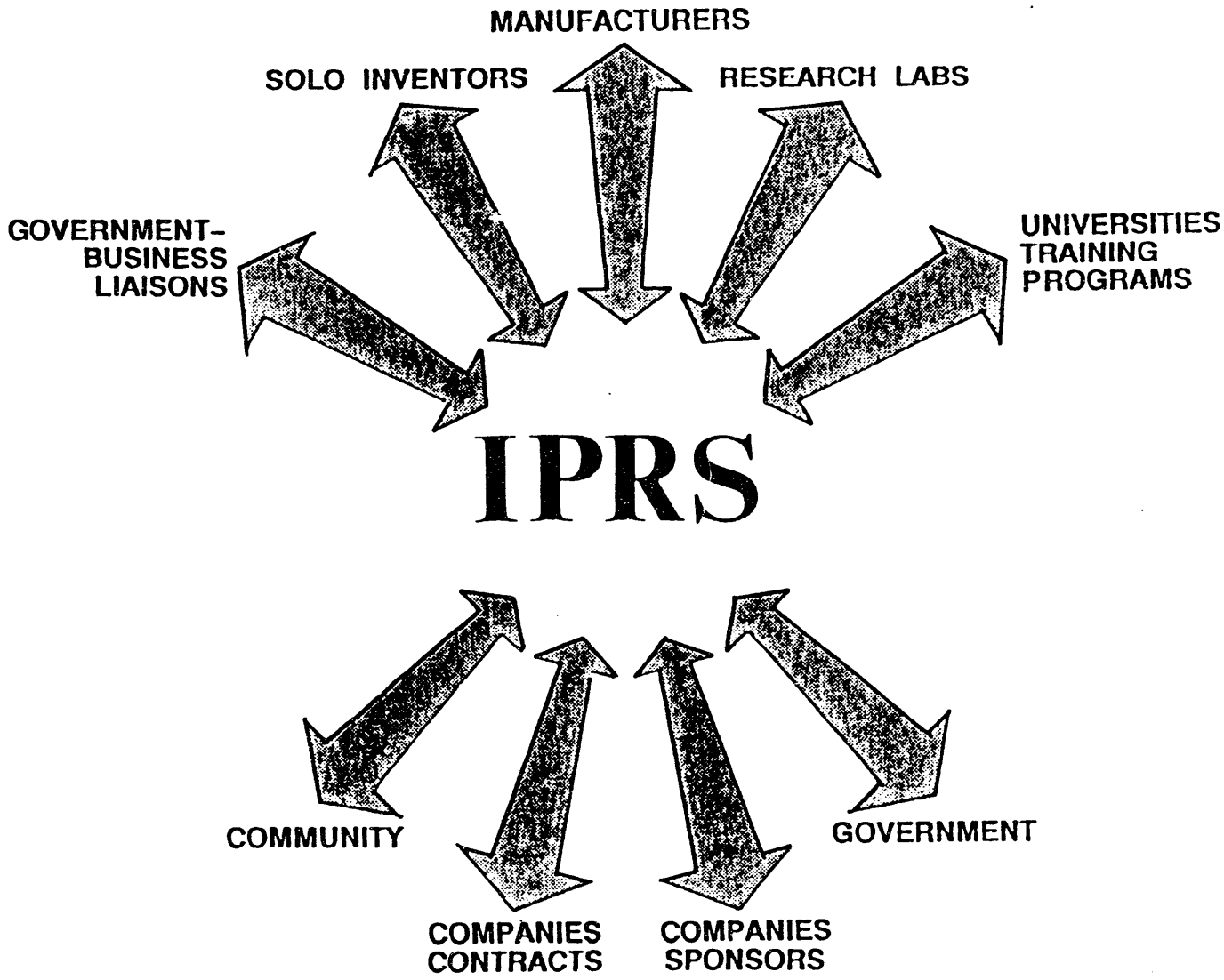
* Dedicated to helping American manufacturers develop Innovative Products.

* Conducting Research on how to develop technology and products and commercialize them more effectively.

* Providing Education and Informational Services.

* Providing leadership in demonstration projects.

NETWORK OF INTERACTIONS

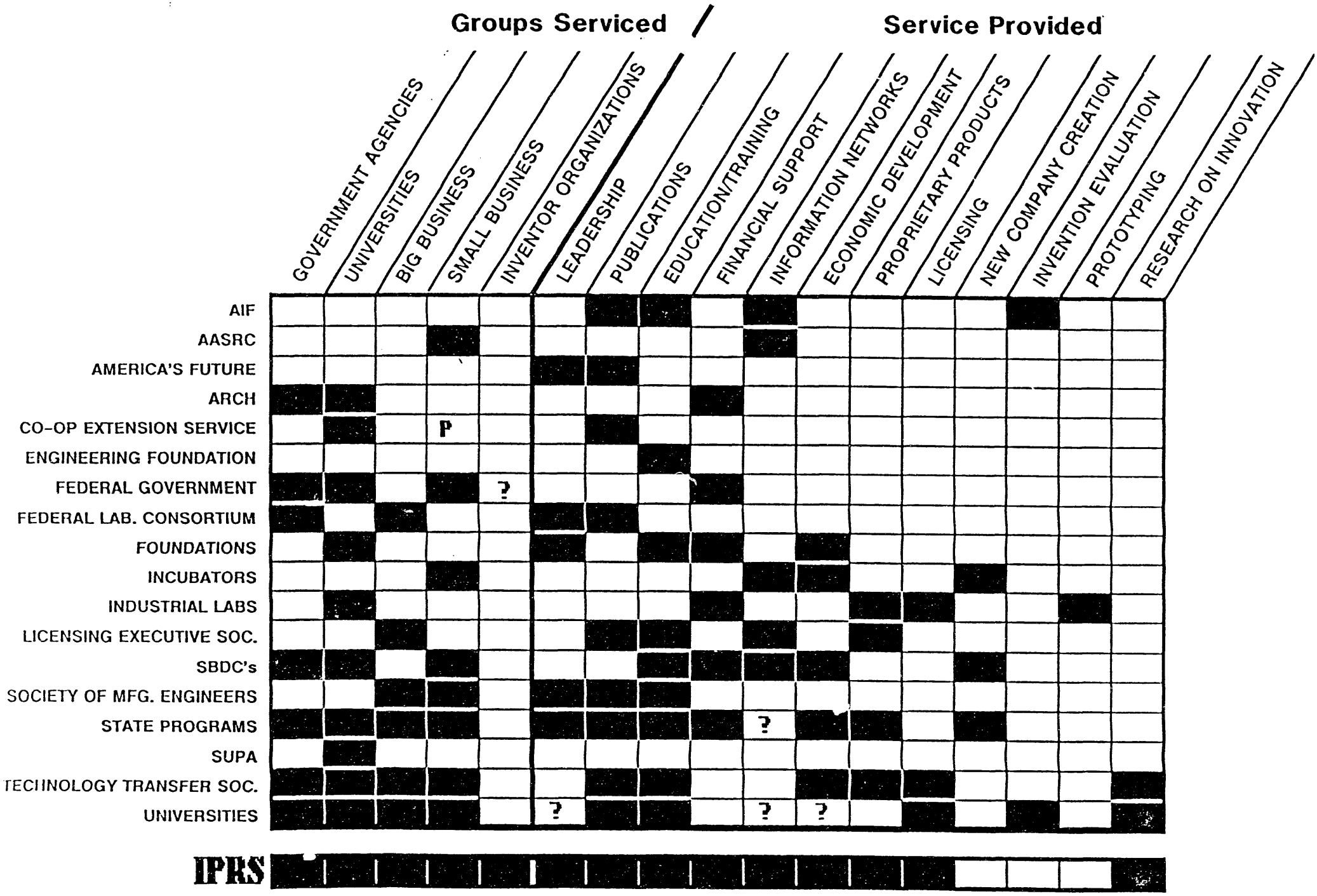


ROLE & PROGRAMS OF IPRS

*

*

*


Groups Serviced / Service Provided
GOVERNMENT AGENCIES
UNIVERSITIES
BIG BUSINESS
SMALL BUSINESS
INVENTOR ORGANIZATIONS
LEADERSHIP
PUBLICATIONS
EDUCATION/TRAINING
FINANCIAL SUPPORT
INFORMATION NETWORKS
ECONOMIC DEVELOPMENT
PROPRIETARY PRODUCTS
LICENSING
NEW COMPANY CREATION
INVENTION EVALUATION
PROTOTYPING
RESEARCH ON INNOVATION
AIF
AASRC
AMERICA'S FUTURE
ARCH
CO-OP EXTENSION SERVICE
ENGINEERING FOUNDATION
FEDERAL GOVERNMENT
FEDERAL LAB. CONSORTIUM
FOUNDATIONS
INCUBATORS
INDUSTRIAL LABS
LICENSING EXECUTIVE SOC.
SBDC's
SOCIETY OF MFG. ENGINEERS
STATE PROGRAMS
SUPA
TECHNOLOGY TRANSFER SOC.
UNIVERSITIES
IPRS

OPPORTUNITIES FOR SUPPORT OF IPRS

* Board Member
* Advisory Board Member
* Consultant
* Donation of Materials and Services
* Financial Supporter

ROLE OF BOARD MEMBERS

* Provide oversight to general operations and programs.

* Provide wise counsel.

* Participate in board meetings and annual meeting.

* Provide access to resources (personnel, equipment, facilities, etc.).

* Be an advocate for programs and policies which will contribute to the success of IPRS.

ROLE OF ADVISORY BOARD MEMBERS

* Provide leadership to programs.

* Provide wise counsel.

* Provide contact to sources of information.

* Provide contact to sources of financial support.

* Provide access to other resources (personnel, equipment, facilities, etc.).

* Be an advocate for programs and policies which will contribute to the success of IPRS.

BENEFITS TO FINANCIAL SUPPORTERS

* An opportunity to make a significant difference in turning around our country economically.

* An opportunity to leverage investments so that positive effects are multiplied.

* Savings in taxes through charitable deductions.

* Receive regular updates/newsletters on programs sponsored.

BENEFITS TO CORPORATE SPONSORS

* Recognition as a leader in making a difference in our communities.

* Early access to new technology and potential products.

* Access to new markets for products and services.

* Receive regular updates/newsletters on programs sponsored.

FINANCIAL NEEDS

*	Seed funding for proposal development and pilot programs.	$100,000
*	Demonstration facilities	$500,000
*	Program management and operations per project.	$300,000

WHAT ROLE WILL YOU PLAY IN IPRS?

* Board Member
* Advisory Board Member
* Consultant
* Donation of Materials and Services
* Financial Supporter

MACRO RESULTS OF IPRS ACTIVITIES

Contribute to the U.S. competitive position in domestic and world markets

More fully use the technology developed with tax dollars

Contribute to reducing U.S. trade deficits

Contribute to the balancing of the federal budget

IPRS NARRATIVE FOR SOLICITING SUPPORT
Version 8/16/91

Note: This narrative is used in conjunction with a flip chart presentation. It should be edited to meet the audience interest and limited to less than 20 minutes.

Hello, I (we) asked for this opportunity to see you because of your position of leadership in your field. As you know, American manufacturers are facing serious competition from foreign firms and there are many aspects to the problem.

Is this a concern of yours?

It is a concern of ours too. The particular aspect we are focussing upon is new product development.

Do you feel that American industry should be more aggressive in the development of new products? "Yes"

Alternate View #1> Hospitals and universities are facing extreme cost pressures and there are many aspects to the problem.

Technology developed in your organization could bring financial relief if properly transferred to commercial ventures. Do you agree?

If there were information and support in licensing your technology would this be of interest to you?

This is one of the purposes of IPRS as we will explain shortly.

Alternate View #2> Small businesses are at a serious disadvantage in underwriting the costs of research and development to build new products. Don't you agree?

If there were a way you could access new technology without having to pay for the research would you be interested?

This is one of the services of IPRS as we will explain shortly.

There are no quick or easy solutions; but, we believe that America can resume the leadership role it once held in commercializing innovative technologies. As you no doubt are aware, innovations in price and performance in automobiles, steel, consumer electronics and other areas have come from the Far East in recent

decades. The solution to the problem is going to take some real leadership and that is why I am (we are) here.

View #1 - What this country needs...

Do you agree that greater leadership is needed?

We are here today because we believe you are such a leader. But just being an innovative, competent and committed leader is not enough...

View #2 - What do you need...

Perhaps you can indicate other resources that are needed to support you in being a spokesperson for innovation in ... manufacturing operations or ...

Where do these resources come from?

View #3 - The Role of IPRS is...

Who is IPRS?

View #4 - IPRS

View #5 - IPRS is ...

Furthermore, IPRS is expanding information about innovation through...

View #6 - Collect resources...

Would such resources and information gathering activities be useful to you in your organization?

In more tangible ways, IPRS focuses on the process of developing and commercial-izing innovative products.

View #7 - IPRS and Product Development.

If we are to be competitive against foreign companies in U.S. markets as well as global markets, we need to do a better job of utilizing our technology resources. We have identified 4 areas where we believe there is significant under-utilization ..

View #8 - Under-utilized ..

Would you agree that these categories represent significant opportunities for obtaining new technologies and products?

You might be asking yourself, aren't others already doing this kind of thing? The answer is, only in part.

View #9 - How IPRS differs..

IPRS differs in the following ways..

View #10 - IPRS doesn't just ...

Some of the organizations which are concerned about technology commercialization are:

View #11 - Chart

Notice that IPRS cuts across many areas and fills significant voids. Especially with respect to practical implementation knowledge (through our sponsored research programs) and networks with independent inventors.

Perhaps you are involved in professional or industry organizations which are also concerned about technology transfer issues and your connections would provide an added link?

We believe that to make a significant difference, a broad network is important to make a significant impact. Wouldn't you agree?

View #12 - Arrows to/from IPRS

You could fit in here ...

The Benefits of being a _____ (corporate, govt, univ...) sponsor are:

View #13 - Benefits to ...

View #14 - Benefits to ... small business

Do you see these as important benefits to you? Your organization?

Besides being a benefit to you and your organization, there will be important society benefits.

View #15 - Micro Results...

There are different roles an individual can play in furthering our objectives of strengthening American industries.

One of the more active roles would be as a board member.

View #16 - Role of Board members...

Another very important role is as an Advisory Board Member

View #17 - Role of ..,

Finally, all of these programs are going to require an investment of dollars in addition to time commitments. The Benefits to financial sponsors are ...

View #18 - Benefits /Role of Financial Supporters

Which program is right for you?

View #19 - Which ...

As a Board Member you will be asked to attend semi-annual meetings, be involved in planning our over-all program and setting priorities, and share responsibility for our success.

As an Advisory Board Member you will be asked to meet regularly, provide a liaison role with your own networks, be available for presentations...

As a sponsor you will be asked to respond to specific proposals and assist in their financing.

Some programs for which we are currently seeking funding are shown in the following pages.

Which of the topics appeal most to you?

View #20 - Topics list.

We can provide further information on that in the near future.

May we count on your support as a ...
Board member
Advisor
Sponsor of

Alternative #1. Thank you, as a board member ... you will receive our meeting reports, status updates on various programs, will be working with other leaders in making a

difference and you will receive a certificate of participation. How would you like that made out?

Should we send that to your work address or home?

Alternative #2. Thank you, as an advisory board member ... you will receive our special meeting reports, status updates on various programs, will be working with other leaders in making a difference and you will receive a certificate of participation. How would you like that made out?

Should we send that to your work address or home?

Alternative #3. Thank you, as a program sponsor ... you will receive our status updates on the sponsored programs, and will have the opportunity to meet with program participants. You will also receive a certificate of sponsorship. How would you like that made out?

Should we send that to your work address or home?

FORMS & FLYERS DEVELOPED

APPENDIX B

IPRS INVENTION DEVELOPMENT PROGRAM AND APPLICATION

Background

Innovative Products Research Services, Inc. (IPRS) of Lexington, MA, has received a grant from the U.S. Department of Energy to pilot an innovative approach to invention development. The program addresses the need for evaluation and feedback during the design and development process from marketing and manufacturing perspectives. Design modifications to make the product more responsive to the needs of potential users and more economical to produce than the original are expected to result from this evaluation process. In most cases, therefore, this feedback should be provided before an invention is patented so modifications can be incorporated into the patent claims.

IPRS has established a marketing panel and a manufacturing panel to review concepts and prototypes and to provide suggestions for improvement. It is anticipated that the inventors to participate in this program will have the resources necessary to implement the suggestions made and that modifications in prototypes will be made for subsequent re-testing and evaluation.

Selection of Inventors/Inventions

The inventors to be selected for participation in this program shall covenant that they have sufficient resources to provide prototypes and modifications thereto through to initial manufacturing run. They further agree to provide documentation of the changes in the design and specifications as a result of participating in the program and agree to allow this data to be published as part of the reports required under the DOE contract. Inventors agree to indemnify and hold harmless IPRS, its employees and consultants and DOE of any untimely release of information or of any potential or actual infringement actions for patents, trademarks, copyrights, trade secrets or any other legal actions. IPRS assumes no responsibility for patenting or patentability of the concepts it chooses to review.

Once an inventor is accepted into the program, his/her invention will be subject to the following criteria:

1) Potentially patentable as determined by a preliminary patent search at a Federal Depository Library or in the U.S. Patent Office in Arlington, VA.

2) Technically feasible based upon known principles and experience;

3) Can be prototyped using readily available resources for a price of less than $25,000;

4) Can be manufactured with existing machinery and methodologies; and

5) The product utility should be apparent to the general pcpulation (though not necessarily used by everyone).

To facilitate efficient market research, groups of products will be selected which can be tested with the same demographic type of users.

To facilitate efficient manufacturing review, groups of inventions will be selected which use similar manufacturing processes (such as plastics injection molding or electronics boards, etc.)

Specific criteria applied subsequent to the initial review are shown in the detailed Market Research and Manufacturing evaluation processes described below (due to the cost constraints of this program we will emphasize only the first two steps).

The Seven Step Market/Product Evaluation Process

1. Opportunity Evaluation
   ... scanning the areas of opportunity

2. Conceptual Development and Evaluation
   ... developing, screening, evaluating and refining the ideas

3. Desirability Evaluation
   ... measuring the level of need and further refining

4. Value Perception and Evaluation
   ... measuring desirability against value

5. Validation
   ... measuring qualitative results against quantitative

6. Creative Development and Evaluation
   ...developing and evaluating final positionings

7. Marketing Strategy
   ... developing and recommending introductory strategy

Design for Manufacturing Evaluation

Products which have passed the tests above and for which pricing and design requirements have been developed will be subject to a review by a panel of experts on manufacturing.

From the manufacturer's perspective there are five basic phases of Product Maturity:

Conceptual and Definition
Advanced Development
Engineering Development
Advanced Production Engineering
Production

The scope of the present study will be to focus on the first two phases and to show how manufacturing inputs alter the basic concept and invention for its betterment. Criteria used in evaluations will include:

Process development
Producibility of invention
Marketability of invention
Supply/demand rates at various cost levels
Automation of assembly and test processes
Facility space requirements at various production rates
Assembly, and support equipment requirements
Production rate ramp up requirements
Make/buy decisions
Resource (vendors, labor, material, etc) availability
Tooling and test equipment requirements
UPC (Unit Product Cost)
LCC (Life Cycle Costing)

Under the cost constraints of the program, detailed analysis will not be made of the foregoing; rather the combined judgment of experts will be documented in qualitative ways.

Note to Inventors

The inventor should understand that the recommendations of the reviewers is not a substitute for judgments which ultimately must be made by the inventor and the inventor in submitting to the review process agrees to bear all responsibility for any consequences of exercising such judgments.

Reviewers have all signed confidentiality agreements with IPRS as part of their participation in this program. IPRS does not however warrant that there will be no inadvertent disclosures to others and inventor agrees to hold IPRS and its officers harmless for any real or potential damages arising out of its involvement with the inventor.

INVENTOR APPLICATION FOR REVIEW

Inventor

Name _____ Referred by _____

Address _____

City _____ State _____ Zip _____

Telephone ( ) _____ FAX _____

Invention

Name _____

Function _____

Benefits and to whom _____

Development stage _____

Prototypes _____

Patent Status _____ Disclosures _____

Resources allocated/available/expended _____

Resources needed _____

Preliminary market evaluation _____

Preliminary cost analysis _____

Principal Materials & Processes _____

Other _____

Acceptance of Terms & Conditions

_____ Date _____

Inventor

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.
P.O. Box 335
Lexington, MA 02173

CONSULTING AGREEMENT

AGREEMENT made this _____ day of January, 1991 by and between _____ whose residence is at _____ in the town and state of _____ ____, ("CONSULTANT"), and Innovative Products Research & Services, Inc., a Massachusetts non-profit corporation based in Lexington, Massachusetts ("IPRS").

IN CONSIDERATION of the mutual promises set forth below, the parties agree as follows:

1. The term of this Agreement will commence on January 2, 1991, and will remain in effect for one year unless terminated by actions provided for elsewhere herein.

2. During the term of this Agreement, CONSULTANT will provide services to IPRS in the nature of evaluating inventions and suggestion improvements in their design and/or market acceptability and generally assisting in meeting the objectives of IPRS to evaluate, design, develop and document the Department of Energy (DOE), ERIP DE-FG02-90CE15983 grant to IPRS.

3. CONSULTANT agrees to make a best effort to be available as needed for implementing IPRS programs and to give adequate notice to IPRS of potential schedule conflicts so as not to jeopardize the meeting of IPRS program milestones. Unless otherwise authorized in writing CONSULTANT shall not be reimbursed for time spent which is not chargeable to currently approved projects or task assignments as identified in DOE contract.

4. CONSULTANT will be paid for services satisfactorily rendered, based upon receipt by IPRS of an invoice showing hours spent working directly on the tasks requested. Payment shall be made net thirty (30) days from date of receipt of invoice except that in the event that IPRS has not yet received reimbursement from the Dept. of Energy, in which case CONSULTANT will be paid within 10 working days from receipt of funds by IPRS from DOE.

5. CONSULTANT will be reimbursed at cost for any authorized expenses necessarily incurred for the performance of the services contracted for hereunder, including but not limited to travel, living expenses, telephone and other telecommunications charges, printing and reproduction charges, and such like expenses on the same payment terms as are set forth in Paragraph 4 above and upon invoices accompanied by valid copies of receipts evidencing all such expenses.

6. CONSULTANT will be paid at the rate of ____ per hour as per DOE contract specifications.

7. CONSULTANT hereby warrants that it has full power to make this Agreement and agrees to grant IPRS all right, title, and interest in all tangible property developed by CONSULTANT in the performance of the Agreement if and when such tangible property is developed.

8. All inventions, discoveries and developments which have been or are in the future made by CONSULTANT, solely or jointly with others, during the period of consulting for IPRS and for one year following the termination thereof, arising out of the assigned tasks under the consulting contract and related to the particular inventions being managed by IPRS are and shall be the property of IPRS or those under contract to IPRS. CONSULTANT agrees to disclose to IPRS all such inventions, discoveries and improvements in a timely manner.

10. CONSULTANT agrees to hold confidential and not use any trade secret, formula, process, method of manufacture or any confidential record, data or information of IPRS or of those inventors being reviewed by IPRS. Material not subject to this agreement includes material which:

a. Was properly in the CONSULTANT's possession prior to working with IPRS as evidenced by written documentation in the possession of the CONSULTANT;

b. Is part of the public domain through no fault or negligence on the part of the CONSULTANT; or

c. Is received without restriction by the CONSULTANT from a third party properly in possession of same.

All drawings, papers and records of any kind relating to the products managed by IPRS, whether or not made by CONSULTANT, are and shall be the property of IPRS, and CONSULTANT will handle such proprietary material accordingly and return it to IPRS upon termination of the Agreement or upon request by IPRS.

11. This agreement shall also apply in the event that this consulting assignment shall at any time or for any period be by any corporation, company or business which is an affiliate or successor of IPRS and shall be retroactive to the date of CONSULTANT'S first working for IPRS.

12. Termination.

A. For Cause: IPRS shall have the right to terminate this Agreement without further obligation to CONSULTANT if CONSULTANT neglects or fails to perform or observe any of CONSULTANT'S obligations hereunder and a cure is not effected by CONSULTANT within thirty (30) days next following its receipt of a cure notice issued by the IPRS.

B. Return of Property: Upon termination, CONSULTANT shall immediately return to IPRS without limitations all documents, drawings, tools, and items of any nature whatever supplied to CONSULTANT by IPRS or developed by CONSULTANT pursuant to this Agreement.

C. CONSULTANT and IPRS may mutually agree to terminate this Agreement at any time.

13. Any notice required to be given under the terms of this Agreement shall be in writing and sent by registered or certified mail, postage prepaid, return receipt requested, to the address as set forth above, or such other address as a party from time to time may have designated by written notice to the other and shall be deemed to have been given when received.

14. This Agreement is for the personal services of the CONSULTANT and therefore not assignable by the CONSULTANT.

15. Under this Agreement, the CONSULTANT is retained as an independent contractor and no performances by CONSULTANT shall be construed as creating either an agency or employment by IPRS.

16. This Agreement, which shall be construed in accordance with the laws of the Commonwealth of Massachusetts, sets forth the entire Agreement and understanding between the parties as to its subject matter and merges all prior discussions between them. In the event any provision of this Agreement is found to be legally unenforceable, such unenforceability shall not prevent enforcement of any other provision of the Agreement.

IN WITNESS WHEREOF, the parties have affixed their signatures as of the day and year first above written.

INNOVATIVE PRODUCTS RESEARCH & SERVICES, INC.

Consultant

_____
Donald D. Job, President

_____

Date : _____

Date: _____

Witness: _____

INVENTOR PRODUCT REPORT

Inventor

Name _____ Referred by _____

Address _____

City _____ State MA Zip _____

Telephone (617) 326-6568 FAX 617 call

Invention

Name Non-Aerosol Applicator

Function May be used with personal care products ....

Benefits and to whom Market is the male consumer in the U.S. and both sexes in many other countries where personal care products are extensively used.

Development stage Concept stage with several approaches to prototypes being considered currently. Patent search in process.

Prototypes No.

Patent Status Search In Process Disclosures _____

Resources allocated/available/expended _____

Resources needed Design and production samples for testing.

Preliminary market evaluation Major personal care products company interested.

Preliminary cost analysis Less than $.75

Principal Materials & Processes Plastic injection molding or blowmold

_____ Date _____

Report Author

INITIAL PRESENTATION

The original concept was for a simple applicator for deodorants which was non-aerosol and which was easier than the pump spray and which provided a spray to the underarm in a uniform way.

The concept was based upon an expressed need of the marketing department of a major personal care products company. The need was for "something new" and for an alternative to aerosol sprays - something which would play well to those with environmental concerns.

A patent search was conducted by D. Job at the local Federal Patent Depository Library. A number of patents were identified which addressed the issue of spray applicators and of applicators for deodorants in particular. Only a few related directly to the specifications. None were in direct conflict with the inventors concept.

INITIAL DESIGN REVIEW

The inventor worked with a product designer/developer to provide some alternatives for designs and functionality. Several technical aspects were considered. One questions was whether a warm air stream could be used to deliver the deodorant such that the sensation during application was one of both warmth and dryness.

INITIAL MARKETING REVIEW

A drawing of the concept will be made and a concept statement developed for presentation to several consumers.

INITIAL MANUFACTURING REVIEW

Prototypes of the various concepts are being developed for testing.

TESTS & EVALUATIONS

Performance tests have yet to be conducted on the various designs. This work continues throughout the design phase.

IMPLEMENTATION

The inventor is currently having his developer document the process, review patents and other resource material and ...

IPRS **Innovative Products Research & Services, Inc.**

P.O. Box 335
Lexington, MA 02173
(617) 862-5008

ACKNOWLEDGMENT OF CONTRIBUTION

The following _____ has provided a grant of money toward the non-profit work of Innovative Products Research & Services, Inc., a Massachusetts based tax exempt corporation. IPRS is chartered under Internal Revenue Services as a 501(c)(3) tax exempt organization qualifying contributors to a tax deduction. Our tax number is: 22-2938424.

The specific project supported is: _____

_____

_____

Amount of grant/contribution received: _____

Received By: _____
Donald D. Job, President

Date Received: _____

AMERICANS UNITE:

HELP U.S. MANUFACTURERS FIGHT BACK

THROUGH INNOVATION!

INNOVATIVE PRODUCTS RESEARCH & SERVICES NEEDS YOUR HELP.

Innovative Products Research & Services (IPRS) is a non-profit Massachussetts corporation which works to preserve and strengthen U.S.-based manufacturing by:

1) Educating public, academic and company leaders as to the importance of manufacturing to the U.S. economy and well-being of its citizens.

2) Communicating the role of new products and patented inventions in reducing international trade deficits.

2) Providing a resource center on innovation, product development and manufacturing processes.

3) Assisting hospitals, universities and government laboratories in transferring their technology to manufacturers.

4) Conducting research in promising areas of technology including medical, robotics, and automation.

IPRS needs your support in developing, publishing, and distributing the facts on innovation and manufacturing strength. U.S. manufacturers can compete effectively at home and abroad if given the tools, the will and the support of its people and government.

Your contribution will help defray the costs of carrying out our programs for keeping manufacturing jobs in America.

Yes! I want to invest in America's future. Sign me up as a member of the support team. I understand that with a contribution of at least $25 you will send me regular reports on your activities - the "IPRS Update".

Enlcosed is a check made payable to IPRS in the amount of $ _____

Innovative Products Research & Services
P.O. Box 335 Lexington, MA 02173
(617) 862-5008

HOW IS THE COMMUNITY SERVED?

Communities in New England benefit when existing manufacturers who are faced with domestic and foreign competition are given an alternative to leaving the area or having manufacturing done off-shore.

The **IPRS** alternative is for these manufacturers to produce proprietary products which are protected against competition. The community benefits from having good-paying manufacturing jobs available. There is a multiplier effect which results in higher personal income and job satisfaction with a larger tax base and dispersion of prosperity to businesses which support the principal manufacturer.

In providing services to other non-profit organizations, **IPRS** provides an additional multiplier effect; namely, we help non-profits become less dependent upon outside support by enabling them to receive income from technologies developed by their staff and faculty. This is long-term income that they would not otherwise receive. The community benefits from the services provided by financially healthy non-profit hospitals, colleges, universities, and research institutes.

WHY TAX EXEMPT?

IPRS has sought Tax Exempt status under Section 501(c)(3) of the IRS code in keeping with its mission for serving public needs in economic development through facilitating technology transfer; in understanding the role of technology in society; in teaching others about product development processes; and in contributing to the development and promulgation of scientific and general knowledge.

We are eligible for support from foundations, government agencies and other tax exempt organizations.

For corporations and individuals our status means donations are tax deductible.

RELATIONSHIP WITH FUNDING SOURCES.

IPRS expects to have on-going relationships with foundations, interested citizens and government agencies. We anticipate that in addition to existing programs, new programs will be developed which will further document a prescription for effective technology transfer and will result in educational activities to impart this knowledge to the public.

IPRS will be decreasingly dependent upon outside support for general operating funds due to our obtaining a share of royalties from those products which we help place with manufacturers; and from royalties on licensed technology which arises from the basic research activities of **IPRS**.

For more information call or write:

Executive Director
Innovative Products Research & Services, Inc.
P.O. Box 335
Lexington, MA 02173
(617) 862-5008

INNOVATIVE

PRODUCTS

RESEARCH

AND

SERVICES

Dedicated to:

Furthering the Process of

Innovation Development

IPRS

WHAT IS IPRS?

IPRS is a unique non-profit organization dedicated to "*Furthering the Process of Innovation Development.*" It is our belief that there is a significant gap between the innovators and the users of technology. By learning how to fill this gap and by teaching others how to do the same, IPRS expects to make a positive contribution to both manufacturers/marketers and to the innovators and their institutions.

The net result will be to contribute to local and national economies by providing proprietary products to manufacturers. These patented products can be produced here in the U.S. without fear of being undercut by products produced less expensively elsewhere. By obtaining foreign patents, overseas markets could also be secured. This will aid in reducing the U.S. trade deficit.

An additional benefit will accrue to any non-profit organization using IPRS's services. Faculty and staff in universities or hospitals for example may develop a technology but may be unable to undertake its commercialization. IPRS will assist in the process and negotiate licensing agreements for royalties which will contribute regular income to the non-profits without jeopardizing their tax exempt status.

PROGRAMS UNDERTAKEN BY IPRS

IPRS will support the maintenance of an information network between universities, hospitals, government and commercial labs, independent inventors and manufacturers.

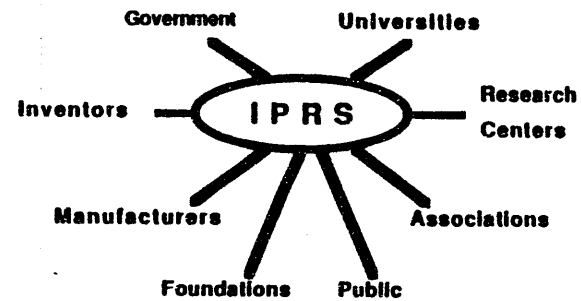
IPRS will support and/or conduct research on the process of innovation development; the economic impact of innovation and manufacturing; and will participate in emerging technologies such as in the fields of medicine, robotics and applied artificial intelligence.

IPRS will demonstrate the value of inventions in economic development and will develop effective means of idea evaluation through hands-on experience.

The IPRS experience obtained in innovation utilization and product commercialization will be made available to others through the sponsoring of publications and workshops.

WHO IS INVOLVED?

IPRS draws upon a broad base of support including inventor and research organizations, manufacturing and trade groups, government agencies, foundations and universities and hospitals. The major groups represented are illustrated below.



The Directors of IPRS have extensive experience in invention development and licensing starting with basic research to applied research, to manufacturing and marketing. An Advisory Board consists of representatives from all the community constituencies.

HOW CAN THE MANUFACTURER BENEFIT?

The manufacturer who faces eroding sales resulting from stiff competition from imports and other lower manufacturing cost regions, can benefit from having a patent-protected product to make. IPRS can serve as a source for new products obtained through its extensive network.

IPRS also serves as a resource for understanding the technology development and commercialization process. For the smaller manufacturer lacking such expertise, this can be particularly valuable.

HOW CAN THE INVENTOR BENEFIT?

An independent inventor or one from a participating university, hospital, research laboratory, or company may request the services of IPRS to refer him or her to suitable resources including manufacturers.

The inventors may take advantage of the information published by IPRS or workshops given on the technology transfer process and thereby be more likely to succeed.

HOW IS IPRS DIFFERENT?

IPRS differs from other research organizations in emphasizing the economic benefits of developing proprietary products; in sharing the techniques used in idea development; and, in undertaking to perform research and education in the public interest.

IPRS differs from most for-profit product development organizations in that its emphasis is on carrying a technology to a licensable stage and securing a license; rather than, on developing products or forming a new business.

From an economic perspective IPRS's efforts result in job stabilization and creation in established businesses rather than creation of new businesses. This approach is likely to have a greater impact on the economy with less risk.

FINAL REPORT

SECTION C - SHARED MARKETING RESEARCH SERVICES

Prepared By

Innovative Products Research & Services, Inc.
Lexington, Massachusetts

Under the Support of U.S. Dept. of Energy
ERIP GRANT #DE-FG02-90CE15983

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SHARED MARKETING RESEARCH SERVICES

BACKGROUND

The primary marketing team consisted of Ed Jeghelian, the team leader, and Donald Job, the Principal Investigator. Additional representatives of marketing disciplines were on the IPRS panel: Harry King (a business broker and manufacturer's representative), David Tompkins (an institutional fund raiser) and Barbara Tepperman (a corporate communications specialist).

Determining the marketability of an invention is a complex and uncertain process. Corporations spend billions of dollars a year on market research and testing of new product concepts; academicians and practitioners write article after article expounding the virtues of various approaches and methods. The process used in the IPRS study is an approach refined through more than 20 years of experience with a wide range of consumer products by Mr. Ed Jeghelian. We chose to emphasize one aspect of market research - that of early stage concept evaluation and consumer feedback. The process used does not provide quantitative estimates of market potential, details on pricing sensitivity, consumer demographics or any number of other parameters of interest to market professionals in large companies. However it does provide immediate feedback from potential customers on design features which can impact the design approach of an inventor and it provides this at a reasonable cost.

The market evaluation process may be divided into four phases as outlined below.

Phase I - Preliminary Analysis
- Objective Analysis
- Subjective Analysis

Phase II - Concept Positioning Development
- Product Analysis Probes
- Positioning Copy

Phase III - Qualitative Concept Research
- Questionnaire Design
- Research Options
  - Personal Interview
  - Mail Research
  - Telephone Survey

Phase IV - Concept Evaluation and Recommendations
- Objective Evaluation
- Subjective Evaluation
- Recommendations

These four phases are discussed in greater detail in the Appendix. The approaches can be further elaborated upon for corporate clients with large budgets for market research. The corporate process is also provided in the Appendix as a point of reference for those aspects which we chose to emphasize in the present study with inventors.

The research option used in Phase III was that of personal interviews, often at shopping malls or other gathering places of appropriate prospects.

PROCESS

The new product development process as applied to individual inventors with patents or product prototypes is similar to that outlined above and in the Appendix. However, for our purposes we chose to emphasize only the early stages which impact product design the most. Our thought process included the following considerations.

1) **Innovation Analysis Phase**
Determine whether the product idea is new and unique.
Consider whether it solves a problem or satisfies an inherent need.
Determine whether its use and benefits are simple to communicate.

2) **Preliminary Marketing Analysis Phase**
Determine where and how such a product will be marketed.
Determine the products' target buying group and its potential size.
Consider which companies or investors might be interested, if any.

3) **Feasibility Analysis Phase**
Determine whether production can be executed through current technology.
Consider the potential selling cost and whether it sounds reasonable.
Consider investment requirements and developmental costs.

4) **Concept Development & Positioning Phase**
Make sure the idea and its benefits communicate clearly and simply.
Communicate its uniqueness.
Make sure its most desirable benefit is communicated.

5) **Qualitative Research Phase**
Determine whether a product is seen as superior to alternative ways to deal with or solve the problem.
Determine whether it is considered unique and highly desirable. Determine whether its performance advantage provides an economic reason to buy.

6) **Confirmation Research Phase**
Refine product design and benefits as needed and fine-tune concept.
Determine target group and potential market opportunity.
Determine strength of product prototype and purchase intent.

SEQUENCE OF ACTIVITY FOLLOWING INITIAL PRESENTATION OF INVENTION OR NEW PRODUCT

PHASE I - PRELIMINARY ANALYSIS

Objective Analysis:

1. Determine if there is a similar or related product on the market.
2. If so, is the new produce an improvement, is it superior, more convenient or far less expensive?
3. If not truly new nor an improvement, recommend stopping further investment
4. Determine if general technology exists for development.
5. Determine if the idea is too complex or too difficult to communicate.
6. Determine if the idea has been tried before, or in another form, and evaluate reasons for success or failure.
7. Estimate the potential selling cost and the target group size and sales potential.
8. Evaluate past successes in the category or in related categories.
9. Evaluate potential competition and potential obstacles to market entry.

Subjective Analysis:

1. Evaluate (judgmentally) merit of idea or invention based on prior experience in category or with potential target buyers.
2. Evaluate the appeal of the product benefits or of problem solution (strong or weak).
3. Evaluate product complexity and potential product value.
4. Recommend, where necessary, product improvements, changes in marketing or positioning approach to strengthen product appeal.
5. Review risks and potential product problems - usage/developmental/marketing.
6. Overall, subjectively analyze the invention or new product with the following probes:
   a) Does it fill a need created by lifestyle or demographic changes?
   b) Is it truly a product improvement?
   c) Does it satisfy an inherent need?
   d) Does it solve a problem better than current approaches?
   e) Is it truly unique and different?
7. Evaluate whether the invention deals with a technological breakthrough in search of a problem.
8. Finally, based on prior experience with thousands of new products, determine whether this particular idea is personally "exciting". (Although highly subjective, the "excitement" criterion is often a very good success indicator, if the consultant involved has strong creative developmental and research expertise within category).

PHASE II - CONCEPT POSITIONING DEVELOPMENT

Product Analysis Probes:

1. What is the primary purpose of the product?
2. Who is it for? Who will use it? Who really needs it? Where? How often?
3. What is its primary benefit?
4. Why is better than what you have or do now?
5. Why is it necessary?
6. What are its secondary benefits?
7. What makes it different?
8. How much will it cost?
9. Why is it worth buying?

Positioning Copy:

1. Develop a concept layout (like a rough magazine ad) consisting of the following:
   a) Mini-headline at the top ... i.e. "A breakthrough in..." followed by...
   b) The primary headline ... describing the product and its benefit synergistically.
   c) The product name along with any descriptive associated with the name.
   d) A drawing, sketch or photo that clearly illustrates the product.
   e) A sub-headline under the drawing - that reemphasizes the primary benefit in more precise terms and adds a related secondary benefit or advantage.
   f) Body copy or Bulleted copy - describing the product in more detail: how it looks, how it works, how it's used, tastes, feels, applied, etc. and any other benefits, uses or advantages it can provide.

2. The headline or body copy should communicate "uniqueness".

3. The primary benefit should be featured in the major headline with a clear product description. The less complex the headline and the briefer it is, the stronger the idea is more likely to be; the better the interviews; and, the more accurate the research.

4. Including secondary benefits and alternative applications or uses in the concept ad can provide excellent insights for concept repositioning and design and product refinements.

PHASE III - QUALITATIVE CONCEPT RESEARCH

Questionnaire Design:

1. Define target group to be screened and interviewed.
2. Develop short and simple one page open-ended questionnaire - with blank spaces for recording verbatim reactions.
3. Include demographic input questions: Age/Sex/Income Level/Current Products.
4. Show respondents concept board and have them read it from top to bottom.
5. Ask for their initial reaction - record verbatim. Underline if response is enthusiastic.
6. Probe for interest level - from Very Interested to Not Very Interested - and reasons.
7. Ask what they like about the idea and what they dislike about it. Record reasons
8. Ask if they think the product is different or unique. And why?
9. Ask respondents to rate idea on scale of 1 to 10.
10. Ask if they would buy the product. Why or why not? At what price would they buy?
11. Ask them to rate their own personal need for such a product on a scale of 1 to 5.

PHASE IV - CONCEPT EVALUATION AND RECOMMENDATIONS

Objective Evaluation:

(According to "success" criteria established by each researcher or research service)

1. "Buying Intent" strength.
2. "Uniqueness" strength.
3. "Concept Interest" strength
4. "Need" rating
5. "Concept" rating
6. Summary and objective evaluation of the product potential based on numbers.

Subjective Evaluation:

(Where strong expertise and research involvement on the specific new product exists)

1. "Enthusiasm" level for the product
2. Reasons given for interest and purchase.
3. Reasons given for lack of interest.
3. First reaction analysis as a cross check.
4. Summary responses for clues to help improve and strengthen the concept and the product and subjective evaluation of the product potential based on qualitative verbatims.

Recommendations:

1. Offer "Go/No Go" recommendation based on Objective and Subjective research analysis and cost/risk ratio involving possible product changes and further testing.

2. If "Go," recommend positioning changes, design changes, product improvements, etc. based on subjective analysis and evaluations - to strengthen positive responses in follow-up research and to insure future success.

3. Where changes required are major, recommend further qualitative research. If changes are minor and responses strong in preliminary quantitative research, recommend quantitative confirmation research, a follow-up product use test and finally a trade research program if appropriate.

TEAM SELECTION

Based upon the interaction between team members it was concluded that there should be at least two members to the marketing team and they should represent two major skill sets:

1) Market research and concept development orientation; and

2) Marketing implementation experience including strategies, niches, trade relations, manufacturing interfaces, etc.

These skills are difficult to find in the same individual and even if such were the case, there are other advantages to having two people with different experiences. Not only will there be a broader experience base, but there will be interaction between the two which will have a synergistic effect.

We also addressed the need for other critical contributors to the overall success of the invention commercialization. These other necessary contributors are as follows:

A. THE NEW PRODUCT CHAMPIONS

The Inventor - has a new invention (highly motivated & personally committed)
(or) **Corporate Management** - makes the company's New Product Commitments
(or) **The New Product Manager** - executes commitment for marketing new products

B. THE MARKET ANALYSTS

The Marketing Director - analyzes and reviews opportunities and potential
(or) **The New Product Manager** - reviews feasibility, opportunities and potential
(or) **The New Product Consultant** - analyzes market, the concept and all phases

C. THE CONCEPTUALIZERS

The Ad Copywriter - writes product description and positioning as requested
(or) **The New Product Manager** - writes rough concept copy for market research
(or) **The New Product Consultant** - develops concepts, new ideas and marketing

D. THE MARKET RESEARCHERS

Internal Company Research Dept. - conducts research with internal staff
(or) **Outside Market Research Service** - conducts less biased external research
(or) **Innovation & Research Consultant** - innovates and conducts creative research

Although **The Market Analyst, The Conceptualizer** and **The Market Researcher** involve the services of three different sources and involve three different disciplines, single source New Product Consultants are available with expertise in all three areas providing multi-level services from creating a new product to marketing execution (e.g. the Venture Marketing Co.).

APPLICATION OF PROCESS AND RESULTS

The foregoing process was applied to three of the four inventions reviewed. Concept statements were developed for each of the three and the statements were presented to prospective customers for their reactions. An example of one such work-up is shown on the following figures for the invention of SE (Figures SE-1 through SE-4). A name was selected and some catchy copy was created which described the product and some of its potential benefits. These sheets were then shown to prospects, they read them and then were asked questions about what they saw as the advantages and disadvantages of the new product. The comments were written down immediately after the interview. Then another person was qualified as a prospect (in this case by asking whether he was a pet owner) and then presented with the concept and interviewed.

Creative Input for Improving Design Features. There were a number of issues mentioned by the consumers which hand an impact on the design as well as the implementation of the product commercialization.

1. Since clear visualization is essential for consumer products, the connectors should be clearly defined and depicted (before and after assembly) - so that there will be no visual confusion as to how the products work. (Need design)

2. Although not a design feature, it is important to provide design specs of the products themselves such as: is the material paintable? How much weight can a table take? What is the product weight and how does this compare in relationship to product strength? As a stand up unit, will the legs be sturdy? What proof is there that it won't sway?

Similar market research materials were generated for the inventions of RT and DJ. The materials are available for review under confidential conditions since patents have not yet issued. We can say however that for RT's invention some of the issues raised were:

1. Cost of the product - more than a dishwasher?
2. Safety
3. Amount of space it takes up in the house
4. Limited capacity despite its size

Some feedback regarding product positioning was also obtained such as: Feature portability, state-of-the-art features, and flexibility.

Figure SE-1
Illustration of Concept Statement Used in Market Research

CREATE A DOG HOUSE

IN MINUTES

WITH THE REVOLUTIONARY NEW

PET CRAFTS

DOG HOUSE KITS

Sturdy, tubular wood kits...
Instantly CONNECT together...
with snap on connectors
so you can

CREATE YOUR OWN DOG HOUSE
any size...any shape...any design
that's right for your dog

* **Super versatile** - lets you build a house as large or as small as you like for your dog....

* **Super creative** - make any style, size or shape to fit your dog's needs for summer or winter indoors or out

* **Super quick and easy.** No special tools needed. Assembles quickly. No nails. No hammers. No screws. Just new, patented connectors.

* **Superior low cost** alternative to buying complex, hard to assemble pre-built units

Figure SE-2
Illustration of Concept Statement Used in Market Research

Introducing ... the First

Design Your Own

Catbana™
Cat Litter Box Enclosures

NEW ... EASY TO ASSEMBLE,
REAL WOOD BUILDING TUBES
THAT SNAP TOGETHER IN
SECONDS
INTO AN ATTRACTIVE
LITTER BOX ENCLOSURE

* Make It As Big or As Small As You Like
* Reduces Litter Box Odor
* Reduces Tracking
* Decorative
* Easy to Assemble - No tools necessary
* Locks securely in place

Figure SE-3a
Illustration of Market Research Report

CONFIDENTIAL Notice Provided for Illustration Purposes

Qualitative Research Analysis
Universal Structures

"CATBANA" Litter Box Enclosure
and
"PET PROJECTS" Dog House, Etc.

General Summary

Preliminary qualitative screening among dog and cat owners suggests a positive interest for a pet product concept offering creativity, exceptional ease of assembly and versatility. However, because of the uniqueness of the product ideas described, the positive reactions were often couched with qualifications, concerns and questions about the products' durability, strength, appearance and the exact nature of the connector or locking assembly.

Because of the limited number of exploratory interviews in this directional phase of new product screening, no serious projections can be made, at this time, as to the market viability and overall appeal of the specific products concepts probed. To determine marketing viability, the following interview variables must be factored into the research design: Urban vs Suburban Living. Living in Homes vs Apartments or Condos. Number of Pets. Years Owned. Indoor or Outdoor Pets. Location of Litter Box. Need Level. Current Solutions. Reasons for Not Buying Dog House or Cat Box Enclosures in the past. Buying Interest Levels. Retail Price Influences. Children at home. Age. Sex. Income, etc.

Perceived Product Advantages

Cat Litter Box Enclosure:

1. Design may be better than current enclosures being sold - (they look unattractive and bulky). The Need exists - customers don't like current choices.
2. Like the idea if it would help reduce litter box odor
3. Sounds easy to put together
4. Could look neat -litter box in bathroom

Figure SE-3b
Illustration of Market Research Report

Dog House:

1. Like that it's simple, snaps together
2. Like that it can be made for my small dog
3. Like that it can made big for large dog/two dogs
4. Like idea for indoors as well/ also for an indoor condo - sleeping basket beds
5. Like single "dog house kit" idea - all you need to build a dog house

Both Concepts:

1. Creative - that you made it yourself. Better than pre-built/pre-fabs
2. Don't need any skills - easy - like Lincoln Logs
3. Don't have to be a carpenter - no nails/no hammer/no measuring/no glue
4. Like no sharp corners or edges
5. Also great idea for kids playhouses, forts - also, coffee tables, cocktail tables
6. Versatile/flexible - great Mail Order idea - multi-purpose products and uses
7. Can be a wicker substitute for beach house units
8. Like idea for bird houses, planters, flower boxes

Perceived Product Disadvantages

1. Have to see one first - See how it works - How it goes together
2. Durability - Will it last long? Is it sturdy/strong enough?
3. Don't know how it will look? Is it attractive? Can it be spray painted? Does it come in colors?
4. For outdoor dog house - Is it water resistant? Water proof when it rains? Cold resistant in winter? Warm enough for dog?
5. How much will it cost? How much cheaper than one you can buy pre-made?
6. Will the bamboo stop litter box odors?
7. Is it washable?
8. Currently have a dog house / Don't need / Have an indoor dog
9. Don't need cat box enclosure / Not a problem / Cat box in basement Utility room / Cat goes outside
10. Easier to Buy Pre-Built.
11. Don't believe:
    ... that it will stand up just with connectors without screws, nails, adhesives, etc. (over time)
    ... that it can be better and cheaper than similar products on the market now

Figure SE-3c
Illustration of Market Research Report

Creative Input for Strengthening Concept Appeal

Both Concepts:

1. Unlike traditional new product concepts where positioning copy can communicate concepts relatively easily, the visual uniqueness of the Universal Structures' products themselves and the questions they generate suggest that photographic visual positionings will be necessary in all phases of product presentation and product marketing. For example in packaging, photographic presentation of what the finished product or products will look like will be essential on the front panel of the package, as well as a clear visualization, on the back of the package, of how the connectors work and how the pieces fit together. Concept research of any consumer product will most effective by the presentation of a tight finished composition of the product itself or better still, with an actual photograph.

2. The importance of super simplicity and ease of assembly (compared to complex step-by-step assembly of unassembled products currently packaged on the market) is particularly appealing to women - and can be a key and an effective selling feature of Universal Structure products.

3. Creativity appears to have strong positioning appeal among those into "crafts" and/or those who like the idea of simple "do-it-yourself" projects.

Figure SE-4
Illustration of
MARKETING & NEW PRODUCT RESEARCH REPORT

MARKETING TEAM

Name: Ed Jeghelian
Address: Venture Marketing, Box 444
Westwood, MA Zip: 02090
Telephone: (617) 326-6568

INVENTION

Name: **Universal Structures (Dog House - Litter Box Enclosure Applications)**

ACTIVITY PHASE

Phase 3 - Follow-up Exploratory Qualitative Research Activity

PROCESS

A. Development of concept boards - two concepts
B. Development of follow-up exploratory research design

1. Verbatim reaction to product concepts
2. Product likes/dislikes - advantages/disadvantages
3 Product interest/desirability/need
4. Product changes/improvements/suggestions

B. Conduct one-on-one consumer survey among women 25-54 (traditional marketing target group)
C. Summarize results for team review

Status: Completed - 7/19/91

NEXT ACTIVITY PHASES

a) Review findings with IPRS DOE Team
b) Review input and implement concept and design refinement where appropriate
c) Develop pricing strategy and feasibility standards for further consumer evaluation and "purchase intent" ratings
d) Include product visual in clear application form for next phase testing
e) Develop revised product positioning concept name and product attribute "need/satisfaction" comparative scale

Report Author Date

Creative Input for Improving Design Features. For DJ's aid to cleaning bathroom sinks the major issue raised was for an adjustable feature. Those surveyed also expressed interest in a water saving setting and in a power clean mode. Consumers came up with some additional benefits and applications which had not been previously identified. Some recommendations for positioning the product were also made, such as featuring the water saving aspect or multiple uses.

Focus Group Session. The EJ invention was handled differently because it was only in the concept stage and because the industrial client had already specified the need. Rather than do consumer research at this stage, we spent the equivalent effort on a brainstorming session among potential technical contributors. Some of the criteria for selecting participants in that session were:

Higher than average intelligence
Experience with new products
Articulate in expressing ideas
Open and flexible in a group
Not abrasive
Well developed sense of humor
Appropriate technical expertise
Having a record of inventiveness

The objective in technical expertise was to get a combination of disciplines and of work experiences that may be relevant to the task. For personal care product applicators we selected the following:

Mechanical engineer - experience in pumps,etc.
Chemical engineer - experience in aerosols and polymers
Biophysicist/Medical - experience in regulated products
Creative marketing - experience in personal care products
Toys & games developer - for introducing the non-obvious
Consumer/User - to do reality checks on use patterns

The session was led by Ed Jeghelian and Don Job. It was set up over dinner to provide a relaxed atmosphere with modest interruptions to allow for tangential thinking. The problem was outlined and then some background material was given which covered existing products and solutions so that we would not spend a lot of time re-inventing present technology.

The form used to cover the confidentiality and ownership issues is included in Appendix C as the Focus Group Release Form.

The results of the session were that some novel approaches were identified. The chemical engineer and the toys and games developer came up with the two most interesting approaches. The proceedings of the session were written up and given to EJ for followup and further development.

INTEGRATION

Interaction with other team members and manufacturing proved to be effective. It was primarily accomplished through meeting with the entire IPRS panel and giving the marketing report and hearing the manufacturing team report. The minutes of past meetings and project report forms were also used as a means of keeping others informed and receiving comments back from them.

The manufacturing team requested specific information from us prior to their making their analysis. We were able to respond in a general way in almost all instances and in some instances in a specific way.

SUMMARY

We were able to test a number of concepts (often two or more per invention) for a reasonable cost since we did several at the same time with the same consumer. This sharing of "mind-space" with the consumer was a cost-effective way of getting input on a number of concepts in a relatively short period of time and for little cost. It did not seem to present a problem to the person being interviewed to be able to switch from one topic to another.

RECOMMENDATIONS

The present study focused on only one aspect of market research, that of early stage concept testing. We were unable to provide in a formal way concrete numbers of market potential and hence of sales volume forecasts. It would have been very helpful to the manufacturing team were we able to provide this information. In future studies it may be worthwhile having a library-based market researcher as part of the team to develop such numbers based on sales of similar or related products.

SECTION C APPENDIX

SHARED MARKETING RESEARCH SERVICES

APPENDIX C-1
TEN-PHASE NEW PRODUCT DEVELOPMENT PROCESS
FOR CORPORATE CLIENTS

1) **Market Analysis and Review Phase**
Determine areas of opportunity within current business categories.
Determine where innovation or product improvement is desired.
Determine where product gaps exist.

2) **Innovation and Idea Generation Phase**
Look for needs created by lifestyle trends and demographic changes.
Look for new ideas or product improvements that satisfy inherent needs.
If an invention exists or is considered, make sure it solves a problem.

3) **Concept Development & Positioning Phase**
Make sure the product idea is new and unique and presented as such.
Make sure the idea is such that it can be presented simply and clearly.
Make sure a desirable benefit or improvement is communicated.

4) **Corporate Strategy & Category Review Phase**
Determine whether the product fits within the company charter.
Make sure competitive disadvantages are minimal or non-existent.
Make sure the product has strong corporate support and commitment.

5) **Feasibility Analysis and Review Phase**
Determine whether it can be done through current technology.
Determine whether the basic technical skills exist within the company.
Determine whether the company has the manufacturing capabilities.

6) **Qualitative Research Phase**
Determine whether the new product is seen as superior to alternative ways to deal with the problem.
Determine whether it is considered unique, desirable and reasonably priced.
Determine whether its performance advantage provides an economic incentive to buy.

7) **Re-positioning Phase or Phases**
Refine product design and benefits as needed and fine-tune concept
Eliminate all unnecessary design elements and weak product appeals.
Incorporate product improvement insights provided by feedback.

8) **Research Validation Phase**
Determine target group and potential market size.
Determine strength of purchase intent at an optimal pricing point. Determine if product delivers as promised in a final "product use" test.

9) **Profitability Projection Phase**
Determine cash flow availability for product development.
Determine whether profits will be realized at the optimal pricing point.
Determine if potential market is large enough for long range profit growth.

10) **Test Market Phase**
Determine whether consumers will buy the product at optimal price.
Determine whether they will buy enough to be profitable for the company.
Determine whether consumers will repurchase after product trial.

APPENDIX C-2
DETAILS OF DEVELOPMENT PHASES

THREE-PHASE "SUBJECTIVE" PRELIMINARY ANALYSIS PROCESS

1) **Innovation Analysis Phase**
Determine whether the product idea is new and unique.
Consider whether it solves a problem or satisfies an inherent need.
Determine whether its use and benefits are simple to communicate.

2) **Preliminary Marketing Analysis Phase**
Determine where and how such a product will be marketed.
Determine the products' target buying group and its potential size.
Consider which companies or investors might be interested, if any.

3) **Feasibility Analysis Phase**
Determine whether it can be executed through current technology.
Consider the potential selling cost and whether it sounds reasonable.
Consider investment requirements and developmental costs.

THREE-PHASE CONCEPT DEVELOPMENT AND PRODUCT RESEARCH

1) **Concept Development & Positioning Phase**
Make sure the idea and its benefits communicate clearly and simply.
Communicate its uniqueness.
Make sure its most desirable benefit is communicated.

2) **Qualitative Research Phase**
Determine whether it is seen as superior to alternative ways to deal with or solve the problem.
Determine whether it is considered unique and highly desirable.
Determine whether its performance advantage provides an economic reason to buy.

3) **Confirmation Research Phase**
Refine product design and benefits as needed and fine-tune concept.
Determine target group and potential market opportunity.
Determine strength of product prototype and purchase intent.

TWO-PHASE MARKETING PLANNING

1) **Business Plan Development Phase**
Summarize product advantages, uniqueness and appeal.
Summarize positive research results and product market potential.
Summarize product objectives and investment opportunities.

2) **Investment Development Phase**
Determine how invention is to be funded.
Determine how much equity can be sacrificed for start up cash flow.
Determine ultimate product sales or licensing goals for R.O.I.

APPENDIX C-3
MARKET RESEARCH OPTIONS

1. **Personal Interviews** - face-to-face interviews - mall intercepts, one-on-ones, focus groups, trade interviews, user area interviews, etc.

2. **Mailed Questionnaires** - random or from acquired target mail list

3. **Telephone Interviews-** random screening or from acquired target group list

THE PERSONAL INTERVIEW

Positives:
The most effective method for invention and new product analysis. It is flexible and permits thorough exploration of the product and its benefits. Also allows for exploration of unexpected issues. Permits creative probing. Lets respondents touch and react to prototypes. Face to face encounters permit interviewer to read body language.

Negatives:
It is expensive. It has the risk of "personal bias". It requires skilled interviewers. It lacks flexibility of changing questionnaires and concept boards during testing.

MAIL RESEARCH

Positives:
Permits contacting a large number of people at less cost. Can target potential customers more efficiently. Can test multiple positionings.

Negatives:
Can take a very long time to get full returns and results. It has the risk of "response bias" - the total response is usually a small biased fraction of those who are sampled.

TELEPHONE SURVEY

Positives:
Possible to contact a large number of people at a reasonable cost. Telephone permits some personalization compared to the impersonal approach of mail research.

Negatives:
Can get only a limited amount of information. Respondent can't see product and react to it. Descriptions of new and unique products often are very difficult to communicate.

APPENDIX C-4

FOCUS GROUP RELEASE FORM

I, _____ agree to participate in a focus group session for the purpose of developing innovative concepts in application of health and beauty aids. I have a background in inventing and/or product development and am participating in this session for the sole compensation of $25 and/or other comparable value consideration (dinner). I understand that I will have no title or share in revenues which may come from the development of ideas, concepts or inventions discussed in this focus group session.

This session will be led by Ed Jeghelian and/or Don Job on the evening of September 11th, 1991 as one of the activities associated with a Department of Energy grant received by Innovative Products Research & Services, Inc.

I affirm that I have no conflict with my present employment in participating in this activity.

I further agree that the novel ideas and discussions held during the focus group will be held in confidence for at least four years from the date of the session or until such concepts cease to be confidential through public disclosure, whichever occurs first.

Date: _____

Signature: _____

FINAL REPORT

SECTION D

MANUFACTURING AND DESIGN SERVICES

Prepared By

Innovative Products Research & Services, Inc.
Lexington, Massachusetts

Under the Support of U.S. Department of Energy
DOE ERIP GRANT #DE-FG02-90CE15983

Table of Contents

SHARED MANUFACTURING AND DESIGN SERVICES

BACKGROUND

The manufacturing review team was led by Ms. Carol Rosa, manufacturing consultant from the firm Consulting Results in Waltham, MA. Ms. Rosa was joined by Professor Sammy Shina, of the manufacturing engineering department at the University of Lowell. Mr. Shina is also author of a recently published book on Concurrent Engineering. The approach of the manufacturing team was a blend of the practitioner and the academic (who was albeit a former practitioner). The core team of two was supplemented on the overall IPRS panel with an industrial designer, Mr. Carl Hardy, and a plastics molder, Mr. Herbert Brown.

The manufacturing and design review process evolved in response to issues raised in working with the inventors and with particular inventions. There was considerable diversity in manufacturing processes represented by the four inventions. It became apparent after working with RT's invention that it would be best to focus our limited time and resources on that one. One reason for this choice was that it was the most complex of the four and any processes developed for it would likely carryover to others. Another reason was that the prototype was most advanced of any of the four.

The team did however address some broader questions as to how to approach various situations. In particular the response of the team was conditioned in part on the market development stage of the product being reviewed. It was also conditioned upon whether the product was evolutionary or revolutionary. These distinctions are elaborated upon below.

Stage of Development. The inventor should be aware of the market development stage in which his invention will be used. An invention will not be successfully implemented if the market conditions do not match the perceived value of the innovation caused by the invention. In addition, the type and level of detail required to perform a manufacturing evaluation on an invention depends on the stage of market development, as shown in Table 1.

The definitions of the four stages of market development and the relation of product development in the manufacturing process are outlined as follows:

Startup Stage - the first stage of a product's life cycle. Emphasis is on the performance of the product. Product development is marked by the intense drive to get to the market as early as possible. Acceptance of the product technology or use is a key issue at this stage. There is minimum product development concern about manufacturing cost. Quality and reliability are achieved through inspection, test, and rework.

Growth Stage - the second stage of a product's life cycle. Emphasis is on the differentiating aspects of the manufacturers. Cost of ownership of the product (such as

field support or quality costs), the commitment of the manufacturers to this business segment, the growth of related products and services supporting the product, and the confidence of the customer in the product are key. There is a significant product development emphasis on manufacturing as a strategic weapon to emphasize low cost and high quality and also on suppliers to improve delivery schedules, reduce costs and improve quality.

Maturity Stage - the third stage of a product's life cycle. A dominant technology,or technique for the product design emerges, while at the same time the market growth slows. The competitive emphasis is on reduced price and improved quality, since the basic design is fixed. Emphasis for product development is primarily on continued improvement in the manufacturing process.

Commodity or Decline Stage - the final stage of a product's life cycle. Either the product becomes a commodity, essentially interchangeable from one manufacturer to another, or it goes into decline, due to replacement by new technology (e.g. 8 track tape players were replaced by mini-cassettes). In either case, the number of product manufacturers will decline to a few big companies, and entry into this market will become very expensive and risky. Revenues per unit decrease rapidly, and manufacturing techniques become the major factor in ensuring the long term survival of the product. The product development emphasis is on reducing manufacturing cost while maintaining high quality.

Evolutionary vs. Revolutionary. The information that will be available to reviewers of the product development process will depend upon whether the product is an improvement of an existing product (evolutionary) or is in an entirely new category (revolutionary). In determining whether an invention is Evolutionary vs. Revolutionary the following questions may be asked:

Is the idea or process already existing?
Is there already a defined marketing need?

If the answers are yes, then the invention is an evolutionary one

Is the product completely new?
Is there no existing market for this product?

If the answers are yes, then the invention is a revolutionary one

The implication of making these distinctions is that for revolutionary products there are few reference points to determine means and costs of production. Furthermore there is probably only a general sense of appropriate pricing in the marketplace; and volume projections are very uncertain. Taking all these factors into consideration, it is difficult at best to develop a manufacturing strategy and provide firm cost estimates. Our experience in dealing with such circumstances is detailed in the following sections.

Table D-1

DATA REQUIRED FOR EVALUATING INVENTIONS

Data Needed	Revol.	Evol.	Start	Growth	Mature	Commodity
Engineering model		x				x
Proposed suppliers		x				x
Detailed product specs		x			x	x
Part specifications		x			x	x
Working prototype		x			x	x
Parts list		x		x	x	x
Detailed prints		x		x	x	
Assembly drawings		x	x	x	x	x
Rough drawings/prints		x	x	x		
Part sketches	x	x	x			
Product general specs	x	x	x			
Product mockup	x	x	x			

From unpublished work of Sammy G. Shina, 1991

Design for Manufacturing Goals. Some of the goals of the design for manufacturing process are listed below.

1) Build quality into the product
2) Reduce labor content of production
3) Reduce materials costs to the extent allowed by quality considerations
4) Produce the product at the lowest reasonable cost
5) Use processes which can meet market demand in a timely way
6) Minimize capital expenditures
7) Reduce the number of assembly operations and components

More specifically it is the goal of the designer and manufacturing engineer to:

Minimize:
Unit, tooling, and test equipment costs
Use of high-cost and/or critical processes
Design changes in production
Use of limited availability items
Down time while meeting delivery requirements/production rates

Maximize:
Design simplicity
Standardization of materials and components
Product inspectability
Product testability
Safety in production
Competitive procurement

The steps taken to meet these various goals are detailed in the process described below.

PROCESS

Input from Marketing. In order to conduct a complete Manufacturing assessment, the Manufacturing team asked for the following information from the Marketing team:

Market Potential Range - potential uses, markets, applications, percentage of market, etc

Pricing Range - approximate sales price anticipated

Volume Range - Identify quantity per time period

Target Market - Identify customer (U.S. vs. Third world; consumer vs. industrial vs. government)

How will the product be promoted and distributed?

Financial and profit requirements?

[**Editor's Note**: Many of these questions went beyond the scope of our assignment for the marketing team; so we provided some approximate answers to such questions so that manufacturing could proceed with their evaluation].

Major Manufacturing Issues. The manufacturing issues to be addressed fall into the general categories listed below.

Feasibility
Barriers to Entry
Manufacturability
Material/Supply considerations
Quality considerations
Resource availability
Risk assessment

The questions raised in Table D-2 have been developed to address these broad issues. The questions have been kept simple in an effort to trigger thoughtful consideration of the issues raised in the questions.

Table D-2
MANUFACTURABILITY ISSUES

Questions	Yes No	Comments
FEASIBILITY		
Does the invention duplicate an existing item?		
Is there a need or desire for such an invention?		
Are the design specs defined and are they compatible with the intended use (i.e. not over- or under-specified) ?		
What is the probable cost of the invention, as currently designed, at some estimated rate of production?		
Is the design configuration well documented?		
Are the design specifications defined?		
Are the design and performance specifications compatible?		
Is there a prototype or prototyping plans that can be evaluated?		
BARRIERS TO ENTRY		
What facilities are required to manufacture/distribute the invented product?		
What are the capital equipment requirements?		
What are the production barriers to entry from competition?		
Are there automation/robotics considerations?		
MANUFACTURABILITY		
Is the design producible at a reasonable cost?		
Is the design within the manufacturing state-of-the-art?		
Are the tolerances too restrictive?		
Are the processes and materials compatible?		
Is the product testable?		
What is the estimated Unit Product Cost (UPC)?		
What is the Life Cycle Cost (LCC)?		
What are the process development needs/issues?		
What type of tooling and test equipment is required?		
Are there significant yield or rework considerations?		
Have alternative processes been considered?		
Are there any packaging considerations?		

Questions	Yes	No	Comments

MATERIAL/SUPPLY CONSIDERATIONS

Have alternative materials been considered which would decrease the cost or increase the availability of material?
Are the tolerances on vendor items too restrictive?
Are the drawings in enough detail to obtain qualified parts?
Are capable vendors established and available?
Are there vendor tooling, test equipment, or facility issues?
Are the processes and materials compatible?
Have Make/Buy alternatives been considered?
What are the purchased parts lead times?
What is the availability of raw materials?

QUALITY CONSIDERATIONS

Is the product inspectable?
What is the anticipated reliability/MTBF?
Have inspection criteria been formulated?
Have critical measurements/performance been documented?
Is there an established way to document rework problems and corrective actions taken?
Is there a way established to track yield and other rates?
Have reasonable quality standards been set?
Are vendor quality records available?
Have pre-award surveys of potential suppliers been conducted?
Is there a Government Qualified Products List (QPL)?
Will source inspection be required?
What are the in-process and end item inspection points for purchased and produced products?
Are there any safety issues?

RESOURCE AVAILABILITY

Are there qualified vendors from which to purchase the needed items?
Are there qualified people available to perform the necessary processes at affordable rates ?
Are there extensive training requirements?
What are the staffing/skill requirements?

Questions	Yes	No	Comments
RISK ASSESSMENT			
What are the technical risks?			
What are the cost risks?			
What are the schedule risks?			

APPLICATION OF PROCESS AND RESULTS

The focus of the team effort was on the mechanical invention of RT for reasons mentioned earlier. The inventor and his associate made a presentation to the IPRS panel which included a demonstration of a full scale working model. It was apparent to all that it was a complex device and would be expensive to produce. There were two electric motors and separate chain drives and there were many custom-built components. The cabinet was nicely fashioned - the inventor is a cabinet maker by trade. The inventor indicated his interest in developing a newer design which would eliminate the motors and simplify the drive mechanism; but cited lack of resources as a major reason for not moving forward on that approach. Mr. Jeghelian raised a number of questions about the market niche and consumer use. He agreed to develop some concept statements and test them with consumers. The manufacturing team raised questions about the methods of manufacture and estimated production costs. The inventor agreed to develop some numbers for the team but did not respond quickly to our request. We subsequently developed some Production Cost Estimating forms and an instruction set to relay to him to guide him through the necessary steps. These appear in Appendix D along with the results of using the questionnaire of Table D-2.

Cost Estimating Forms. The Cost Estimating Forms divide the process into two areas - labor and material. Labor estimates are done according to the various sub-assemblies. As a starting point the inventor was asked to estimate his time to build a second unit. The material estimates are done on a part-by-part basis. It was recommended that the inventor assign part numbers where none exist so that they can be referenced in a uniform and unambiguous way.

The inventor was also encouraged to prepare a set of assembly instructions outlining which parts should be installed first and what the complications might be if the assembly was in a different order.

The inventor responded to our request for further information with a detailed parts list but did not respond to the other requests.

Establishing Minimum Requirements in the Evaluation Process. Each invention will have different factors from the above questionnaire of Table D-2 which will be critical to the success of the product from a manufacturing perspective. It will be important to establish what factors are critical for the individual invention and which factors are less critical. In this way, the evaluation can focus on the most important factors and the resultant action plans can be targeted to those critical factors. Also, if a critical factor is determined to be unachievable, this will strongly influence the outcome of the manufacturing assessment.

Evaluation of RT's Invention. In the case of the RT's invention, the critical questions are most likely marketing questions, i.e. is a dishwasher sized and priced appliance a practical and widely acceptable solution to recycling considerations, given the cheaper and smaller and/or more flexible alternatives (such as multiple bins for the various containers which can be stacked in closets or stored in basements, porches, or utility closets)?

Given the above marketing consideration, the most critical manufacturing considerations in the case of RT's invention are probably cost considerations. In this case, the inventor plans to license the design to a manufacturer / distributor and will need to convince the potential licensee that the compactor can be produced at a low enough cost, to make the product marketable at a reasonable profit. The volume of sales, also a marketing consideration, will strongly influence this costing exercise, since quantity discounts will significantly influence the unit cost in production.

The manufacturing considerations which will be most important in driving the cost are types of materials to be used in the production of the invention (machined vs castings; plastic vs metal vs. wood; etc.) and the tolerances and performance specifications. It will be critical to establish the lowest cost approach which meets the overall standards (size, noise level, aesthetics, etc.) early in the design stage (i.e. design for manufacture). In addition, the process by which vendors are chosen will be essential. High quality vendors with competitive prices will strongly influence overall product cost.

While cost of manufacture is very often an important factor, it is not always the most critical factor. Availability of materials and/or qualified vendors and the technological state-of-the-art are often significant factors. The marketing assessment will shed much light into what the driving factors in manufacturing will be.

Marketing/Manufacturing Interaction and Integration. The input of marketing was a significant contribution to facilitating the manufacturing and design assessment. Given the estimated cost of the unit, some "high-end" market niches were proposed.

MANUFACTURING TEAM MEMBER(S) SELECTION

Selection Criteria. If another organization wishes to establish a manufacturing/design assessment team in another area that is similar to the Boston-based IPRS team, the following recommendations are made:

1. There should be at least two members to the manufacturing team representing two major skill sets:

a) The engineering and manufacturing technology skills needed to advise on manufacturing processes and materials; and

b) The operation skills needed to assist on the manufacturing quality and regulatory standards, material procurement and manufacturing controls.

2. The manufacturing team members should have at least 5 years experience in the actual participation and management of manufacturing operations and engineering functions.

One person may have the primary role with most of the work assigned to him or her; but, a second person with manufacturing experience is desirable to bounce

ideas off and to do general brainstorming about the specific invention and/or the more general manufacturing assessment process.

3. The manufacturing people should have direct manufacturing experience in industry or should have had that experience at some time in their past.

The latter criterion is important because practical knowledge of the manufacturing issues inherent in the invention are more obvious to a person with hands-on experience versus someone who has strictly academic knowledge. A combination of academic and consulting knowledge would be acceptable, as long as the consulting was hands-on.

Manufacturing people with an awareness of marketing issues would be highly preferable to a strictly production orientation. This is important because the marketing issues in a new invention are closely related to the manufacturing considerations to be made and the overall decisions and recommendations to the inventor should carefully consider both manufacturing and marketing factors.

Where to Find People. People with appropriate manufacturing experience may be found through trade associations, professional organizations and inventor groups. One of the professional organizations found to be especially helpful is the Society of Manufacturing Engineers (SME). Industrial engineers/designers can be located through the Industrial Design Society of American (IDSA) which has local chapters throughout the United States.

SUMMARY

There were a number of lessons learned in the process of evaluating inventions for manufacturability. One lesson was that most inventors do not ever get to the stage of evaluating manufacturability. They stop with working prototypes.

Second, inventors often do not know how to approach the manufacturing process. The procedures we developed should be helpful to other inventors as well.

Third, inventors need a lot of support in the rather detailed process of generating cost estimates and related information needed to do an in-depth manufacturing and design assessment. They are easily overwhelmed and unable or unwilling to respond to requests for detailed information.

Re-designing for manufacturability can have a significant impact on the costs and ease of production and can make the difference between being priced out of the market or priced to sell in large volume.

In summary, the team approach worked well in providing a high level of service to the inventor; but, it was not clear how effectively the inventor can utilize this much assistance.

APPENDIX: SECTION D

APPENDIX D

INVENTION COST ESTIMATING FORMS

By Carol Rosa of Consulting Results

The enclosed forms and instructions were prepared to aid the inventor in the process of estimating labor and material costs of the proposed invention. These estimates are useful to the inventor in determining the overall unit cost of the invention and also provides a format for the inventor to document his or her invention design and build. This information is useful to IPRS in making a manufacturing assessment of the production costs of higher volume production. In addition, potential investors, buyers of the invention, could utilize this information to make manufacturing and pricing decisions.

The enclosed forms are as follows:

COST ESTIMATING FORM FOR LABOR

COST ESTIMATING FORM FOR MATERIAL

INSTRUCTIONS FOR COST ESTIMATING FORMS

DETAILED ASSEMBLY INSTRUCTIONS/DRAWINGS DESCRIPTION

NEW INVENTION -- COST ESTIMATING FORM
Rev. 3/17/91, C. Rosa

LABOR

	SUBASSEMBLY NAME	HOURS TO BUILD ONE	ESTIMATED HOURLY RATE	TOTAL LABOR COST	DESCRIPTION OF EFFORT
1					
2					
3					
4					
5					
6					
7					
8					
9					
10	INTEGRATION				
11	TEST				

NEW INVENTIONS - COST ESTIMATING FORM

Rev. 3/17/91, C. Rosa

MATERIAL

	PART NAME/NUMBER	SUBASSEMBLY	# PER UNIT	COST/UNIT	EXTENDED COST
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

INSTRUCTIONS FOR COST ESTIMATING FORMS
LABOR AND MATERIAL

LABOR

SUBASSEMBLY NAME: The name the inventor has given to a particular subassembly in the invention.

HOURS TO BUILD ONE: The number of hours it would take the inventor to build one subassembly. This estimate should be based on the actual build, not including any design effort. It may be easier to think of it as the estimate to build the second subassembly after the design has been solidified a bit. Please note if there is more than one subassembly of this type in the overall invention.

ESTIMATED HOURLY RATE: Estimate the type of skill required to do this effort (i.e. carpenter @ $20/hour; electrical technician @ $15/hour; etc.)

TOTAL LABOR COST: The number of hours to build one times the hourly rate.

DESCRIPTION OF EFFORT: A brief description of the subassembly effort. For example: "Build wiring harness assembly for starter mechanism".

INTEGRATIONS: The estimated time and cost to integrate the subassemblies into the overall product.

TEST: The estimated time and cost to test the unit after it has been integrated. If there are additional subassembly tests during the build cycle, list and describe these as well.

MATERIAL

PART NAME/NUMBER: If the part is commercially available, list the manufacturer's name, part name, and part number. If the inventor designed the part, the inventor should name the part and assign it a part number.

SUBASSEMBLY: Identify the subassembly (or subassemblies) in which the part is used. List each subassembly separately.

PER UNIT: Identify the number of this part that is used in each subassembly.

COST/UNIT: Identify the purchase cost of the part. If the part was designed by the inventor, estimate the cost to reproduce this part.

EXTENDED COST: Multiply the number of units per subassembly by the cost per unit to obtain the extended cost.

DETAILED ASSEMBLY INSTRUCTIONS/DRAWINGS

Prepare a detailed description of assembly instructions for each subassembly, and also for the integration and test of the unit. These step-by-step instructions should be written in enough detail so that an experienced technician or engineer could replicate the process just by reading the instructions. These instructions should also include any potential problems which the technician or engineer may encounter and how to avoid these problems. The inventor should include any lessons he or she may have learned during the invention process. The instructions should include a flow chart of the build/integration/test cycle which details in what order the unit is built and how the various subassemblies are integrated into the whole unit.

Drawings which detail the dimensions and configuration of each of the units and the overall unit are very helpful in assessing the design and should be prepared in as much detail as possible. As an absolute minimum, the overall outline drawing should be provided showing all subassemblies positioned within the unit.

EVALUATION OF RT's Invention

Questions	Yes	No
FEASIBILITY		
1. Does the invention duplicate an existing item?		x
2. Is there a need or desire for such an invention?	x	
3. Are the design specs defined and are they compatible with the intended use (i.e. not over- or under-specified)?	x	
4. What is the probable cost of the invention, as currently designed, at some estimated rate of production?		
5. Is the design configuration well documented?		x
6. Are the design specifications defined?		x
7. Are the design and performance specifications compatible?	x	
8. Is there a prototype or prototyping plans that can be evaluated?	x	
BARRIERS TO ENTRY		
9. What facilities are required to manufacture/distribute the invented product?		
10. What are the capital equipment requirements?		
11. What are the production barriers to entry from competition?		
12. Are there automation/robotics considerations?		

Comments

1. There are alternative solutions which should be closely evaluated to ensure real "need".
2. Increased recycling efforts.
3. Preliminary design is thorough.
4. Not yet determined.
5. Inventor/builder have knowledge not formally documented.
6. Some work required to set noise limits, weight considerations, type motor (current vs. hydraulic).
7. Not pushing state-of-the-art.
8. Excellent working prototype which is very helpful in evaluation.
9. Assembly facilities - most modules can be purchased separately and assembled. Distribute through appliance dealers. Inventor plans to sell or license design. .
10. Mostly fixturing and final test if assemble only.
11. Minimal.
12. If enough volume, could consider automated assembly.

EVALUATION OF RT's Invention - Page 2

Questions	Yes	No
MANUFACTURABILITY		
13. Is the design producible at a reasonable cost?	x	
14. Is the design within the manufacturing state-of-the-art?	x	
15. Are the tolerances too restrictive?		X
16. Are the processes and materials compatible?	x	
17. Is the product testable?	x	
18. What is the estimated Unit Product Cost (UPC)?		
19. What is the Life Cycle Cost (LCC)?		
20. What are the process development needs/issues?		
21. What type of tooling and test equipment is required?		
22. Are there significant yield or rework considerations?		X
23. Have alternative processes been considered?		X
24. Are there any packaging considerations?		X

Comments

13. Detailed analysis not done, but seem to use standard components so should be reasonable cost.
14.
15. Need tighter tolerance for noise.
16. Can use less wood.
17. Could easily develop tests on actual disposables.
18. To be determined.
19. To be determined.
20. Quieter motor, electricity requirements, safety issues, capacity requirements.
21. Minimal for assembly - use actual garbage to test.
22. Unknown at this time, but unlikely.
23. Minimal consideration to date.
24. Same as any major appliance.

EVALUATION OF RT's Invention - Page 3

Questions	Yes	No
MATERIAL/SUPPLY CONSIDERATIONS		
25. Have alternative materials been considered which would decrease the cost or increase the availability of material?		X
26. Are tolerances on vendor items too restrictive?		X
27. Are the drawings in enough detail to obtain qualified parts?		X
28. Are capable vendors established and available?	x	
29. Are there vendor tooling, test equipment, or facility issues?		X
30. Are the processes and materials compatible?	x	
31. Have Make/Buy alternatives been considered?	x	
32. What are the purchased parts lead times?		
33. What is the availability of raw materials?		

Comments

25. Minimal work done on cost reductions.
26. Mostly standard components.
27. Informal/nonexistent drawings.
28. Standard components.
29. Standard components.
30.
31. Plans to purchase most components.
32. Unknown.
33. Readily available.

EVALUATION OF RT's Invention - Page 4

Questions	Yes	No
QUALITY CONSIDERATIONS		
34. Is the product inspectable?	x	
35. What is the anticipated reliability/MTBF?		
36. Have inspection criteria been formulated?		X
37. Have critical measurements/performance been documented?		X
38. Is there an established way to document rework problems? and corrective actions taken?		X
39. Is there a way established to track yield and other rates?		X
40. Have reasonable quality standards been set?		X
41. Are vendor quality records available?		X
42. Have pre-award surveys of potential suppliers been done?		X
43. Is there a Government Qualified Products List (QPL)?		X
44. Will source inspection be required?		
45. What are the in-process and end item inspection points for purchased and produced products?		
46. Are there any safety issues?	x	

Comments

34. For conformance to specs and to safety requirements.
35. Should be highly reliable with long mean time between failures (comparable to any appliance).
36.
37.
38.
39.
40. Preliminary work did not address.
41. Not requested at this time.
42.
43.
44. Unknown at this time.
45. Unknown at this time.
46. The safety issue has been addressed by not allowing compacting unless door is closed.

Questions	Yes	No

RESOURCE AVAILABILITY

47. Are there qualified vendors from which to purchase the needed items?
48. Are there qualified people available to perform the necessary processes at affordable rates?
49. Are there extensive training requirements?
50. What are the staffing/skill requirements?

RISK ASSESSMENT

51. What are the technical risks?
52. What are the cost risks?
53. What are the schedule risks?

Comments

47.
48.
49.
50.

51.
52.
53.

END

DATE FILMED

12/28/92