Invention Evaluation and Transfer Assistance Act

Invention Evaluation

1. Firms or investors are far more willing to consider ideas of independent inventors that have been reviewed and found to have merit by competent reviewers. For this reason, the first step in assisting independent inventors should be provision for an impartial review of their inventions.

2. The impartial review of an invention should be done by multiple experts who understand the steps from invention to market success and who are familiar with the industry involved. The people who do this work must use imagination to see opportunities and exercise caution. They will probably not work well in a large bureaucratic organization. The terms of employment and remuneration of these experts should provide an incentive for producing quality reviews without creating a conflict of interest. The process for reviewing inventions should depend on a number of decentralized review teams rather than a large centralized organization.

3. To ensure a level of review quality, the reviewers should follow uniform centrally developed guidelines and processes.

4. There are few if any, Government jobs that can prepare a person to be an invention evaluator. Most junior Government jobs are highly specialized, and do not involve market analyses, production engineering, sales promotion, and other key fields of knowledge. Further, if Government employees were to do this work, there would be neither a practical way to teach them nor a career path for their growth and promotion.

5. If universities or other public service organizations that already evaluate inventions were to manage the review teams, the personnel problems might be far easier to handle. These organizations have already developed processes for selecting, training, and providing for the needs of skilled evaluators. In addition, graduate students could be employed to do preliminary screening, both as a learning experience and to save time for more senior evaluators. These students could apply relatively simple criteria to weed out impractical, unworkable, or inadequately developed ideas.

6. Inventions should be reviewed both for technical feasibility and commercial potential. A statute creating the process should provide latitude to develop and adjust the criteria on the basis of experience rather than legislate the way evaluations are made. The criteria should, however, require

examination of an invention's sales/profit potential; projected growth rate and market life; the competitive situation; potential impact on the industry; risks; and special legal, political and social factors such as anti-trust, safety, ecology, and international considerations.

7. There must be extensive protection of the inventor's proprietary rights. This includes:

   - A pledge of confidentially by all who process or evaluate an invention.

   - Avoidance of conflict-of-interest situations for the evaluators by preventing their reviews of inventions in that might directly affect their personal financial interests.

   - Legal certainly that submission of an invention for evaluation does not constitute publication or affect any patent action time limits.

8. There may be some form of initial funding to help establish evaluation centers, but after a pre-determined startup period, the centers must be self supporting.

9. The evaluation centers should ultimately be supported by user fees paid by inventors and other users.

10. There should be minimum standards for the content of evaluation results to be provided to inventors. These standards should be authorized or mandated in legislation, but developed and revised as necessary by an Executive Branch agency.

11. Brief description of inventions and their evaluation may be put into some form of data bank to help firms locate ideas for new products or processes. An inventor must have the right to control the inclusion of his idea after being informed of the effect inclusion may have on his ability to obtain patent protection.

12. Some Executive Branch agency should have the authority and funding to establish the network of centers and review teams, set performance standards for them, perhaps provide start-up funding, and monitor their operation. The intent of the program and the authorities of the responsible agency should be stated clearly, but the agency should have substantial discretion in how the program is implemented and revised on the basis of experience. There should be a requirement for the agency to monitor and evaluate the performance of the review centers.

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Small Business and ~~Small Business Innovation~~

Independent Inventor Assistance Act
(IIAA)

SBIIAA

Title I Invention Evaluation

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13. ~~The~~ agency could develop and maintain a directory of testing services and laboratories with descriptions of their capabilities and services (e.g., material fire testing, consumer-type evaluation, performance claim verification).

14. The agency could develop and maintain a list of manufacturing firms that invite inventors to submit ideas. The list should include the firms' policies and procedures for initial inventor contacts. This might be done under Title II (following) but it is put here since firms might be more approachable by inventors with positive preliminary evaluation reports. The firms might wish to restrict their invitations to inventions with positive, independent evaluations.

Title II Inventor's Agents

Many inventions with commercial potential are not used because firms and inventors have trouble communicating their interests and reaching agreements. In other fields such as

publishing, real estate, and securities, agents or brokers perform the function of pairing strangers. There is a group of "idea brokers" or "invention promoters" who prefers this function, but their performance record is not good. The Government could stimulate the development of a group of inventors' agents to bridge the gap between inventors and those who would use or finance their inventions. This could be done through the following steps.

1. Establish a code of conduct to which agents would voluntarily agree to abide.

2. Publish a list of the agreeing agents, the services they provide (e.g., locating purchaser or licensees, finding venture capital, helping new businesses start etc.), and the fields in which they specialize (e.g., electronics, automotive, medical, etc).

3. Invite inventors and firms to report their experiences with agreeing agents under statutory protection against liable.

4. Allow agents to review comments and provide a rebuttal or supplementary information - also with statutory protection from liable. The reports and agent responses would be made available to inventors seeking an agent.

HARVARD UNIVERSITY

M/IT - Dr...

FACULTY OF ARTS AND SCIENCES
OFFICE OF THE SECRETARY

UNIVERSITY HALL B-1
CAMBRIDGE, MASSACHUSETTS 02138

May 2, 1983

PROPOSED GUIDELINES FOR RESEARCH PROJECTS UNDERTAKEN IN COOPERATION WITH INDUSTRY

Preamble

Harvard University welcomes industrially supported research agreements because they can stimulate its investigators, promote technological transfer, and provide the University with valuable support. At the same time, it recognizes the need to avoid arrangements that might compromise, or seem to compromise, its intellectual principles and purposes and the freedom of inquiry the members of its Faculties enjoy. As an institution, the University benefits from public research funds and the public's trust, and it has an obligation to develop its research discoveries with concern for the public's interest.

These guidelines outline some general principles -- concerning how and why research is conducted at the University -- with which all research agreements with non-governmental external sponsors (referred to, hereafter, as industrially-supported research agreements) should conform.

I. Conduct of Research

The exchange of information and the discussion and interchange of ideas are basic elements of all University research. Agreements to perform secret research in Harvard laboratories are unacceptable.

A. The proscriptions on secrecy in cooperative university-industry research agreements must conform with those that apply to federally-sponsored research. If a research project involves confidential information that would inhibit free and open interactions among scholars, the University should not accept it.

B. It is essential that the research of students and postdoctoral-fellows-in-training contribute, and be perceived to contribute, to their scholarly development. Even as individuals, they should not ordinarily participate in agreements that involve confidential information or otherwise constrain the right to publish or communicate freely. Exceptions consistent with the University's principles should be approved in advance by the student's Department or at a higher level. In addition, Departments should periodically review the work of students engaged in industrially-sponsored research to see that the educational commitment of the University to its students is maintained.

C. Agreements may permit industrial sponsors to examine completed manuscripts for potential patent applications, but agreements may not restrict the rights of investigators to publish their findings nor to communicate their research results freely in other ways consistent with protecting patents from "disclosure" and other ethical and professional standards.

Agreements to treat University-based research as confidential, to withhold publication or delay it significantly, or to permit sponsors to modify materials submitted for publication, are ordinarily unacceptable.

D. The responsibility for research programs and flexibility in directing them must remain with principal investigators. Sponsors may consult on matters of mutual concern but they may not dictate how research shall proceed.

E. All research proposals must be approved by appropriate Departmental authorities.

F. Faculty members should be informed of the existence of cooperative agreements in their Department, and any special provisions in these agreements should be explained to them.

G. General information on the subject, duration, funding sources, and budget of each industrially-sponsored research agreement should be openly available, along with information on whether there are any associated exclusive or nonexclusive patent agreements or other restrictions on open communication.

H. The support of a major portion of a faculty member's research by a single corporate sponsor is generally undesirable; whenever such support is permitted, the research should be periodically reviewed and approved by the appropriate Dean.

I. It is expected that these guidelines on free and open exchange of information will be followed in all instances that involve concepts, processes, products, and other information about natural phenomena. There may, however, be situations (for example, studies involving records of individuals or identifiable industrial organizations, or university-coordinated educational programs of an apprenticeship character) where exceptions to these guidelines are consistent with the University's educational, professional, and scholarly principles. Such exceptions should be granted only after detailed review by the appropriate Dean with advice from appropriate Faculty Committees, and the reasons should be publicly explained.

II. Motivation for Research (Conflicts of Interest)

Faculty members have a responsibility to maintain the scholarly character of their research. Faculty members who propose to participate in industrially sponsored research must disclose in confidence to the designated individual or committee, the nature of all personal commitments to, and remuneration by, the industrial sponsor. (In this context, personal commitments and remuneration are understood to include equity options and holdings as well as income from consulting or other services.) Questions emerging from such disclosures should be resolved with the Dean of the Faculty and/or the appropriate faculty committees before the University accepts the sponsored research agreement.

Section 1. This Act may be cited as the "Innovation Evaluation and Technology Transfer Act of 1983."

Section 2. (a) The Congress finds that-

(1) innovation creates jobs, increases productivity, competition, and economic growth; and

(2) the rate of productivity growth in the United States over the past decade has been well below that of the leading industrial nations; and

(3) one of the major reasons for this relative decline in United States productivity is our failure to take advantage of existing technologies.

(b) The purposes of the Act are to-

(1) stimulate innovation; and

(2) increase the use of existing innovations by matching them with potential users.

Section 3. Section 9 of the Small Business Act (15 U. S. C. 638) is amended ---plug into the SBIR section

(1) by requiring the Small Business Administration to coordinate with agencies conducting SBIR programs to select top-tier SBIR proposals not receiving Federal funding but which have been found to be technically and commercially feasible to be entered on the Department of Commerce's centralized database of innovations that have been judged by experts to show significant potential as to commercial and technical feasibility.

(2) The Small Business Administration shall provide information to small firms concerning the potential benefits to them of participating in the innovation evaluation program described in Section 4 and Section 5.

Section 4.

(1) The Department of Commerce shall establish five innovation evaluation centers which shall be located at universities conducting Federally-funded research. Each of these centers shall be established in one of the Department of Commerce regions, but in no instance shall more than one center be located in any region.

(2)/(a) The innovation evaluation centers shall be run by private sector personnel under government contract. These personnel shall be responsible for receiving and for conducting a preliminary screening of innovations which are submitted to them. The preliminary screening shall be designed to eliminate technically and commercially faulty inventions. After the initial evaluation, personnel shall be responsible for forwarding innovations which appear technically and commercially promising to two independent reviewers chosen from a list of names selected by a Presidential Commission. In some instances, center personnel may find it necessary to forward innovations to outside sources for the preliminary screening.

(b) Innovations which have passed a preliminary screening and which have been judged by two independent reviewers to show significant potential as to technical and commercial feasibility shall be described, and this description, along with the reviewers' evaluations and relevant graphic representations, shall be entered on a computer terminal located at the innovation evaluation center. If the two second-stage reviewers are in disagreement as to the technical and commercial value of an innovation, the proposal will be sent to a third reviewer. If the assessment of the third reviewer is positive, that review, along with the other positive review, will be entered on the computer terminal.

(c) Fees shall be charged for both the preliminary and the second-stage screening, and all reviewers shall be paid for their services.

Section 5. The computer terminals at the innovation evaluation centers shall be connected to a central computer which shall be run and monitored by the Department of Commerce. The database of this central computer shall be licensed for a fee to the private sector. Licensees which allow third party access to the database shall pay back to the Commerce Department a portion of the fee charged by them for entry into the system. The Commerce Department itself shall not run an on-line system; rather, it shall act solely as the licensor of the database.

Section 6. A Presidential Commission which shall be under the auspices of the Commerce Department and the National Science Foundation shall be established. Commission members shall include representatives of Federal agencies conducting research and research and development programs, and members from the academic and business communities. Selection of reviewers to evaluate innovations shall be made by this Commission.

Section 7. The Department of Commerce shall issue regulations governing the fees to be assessed against those submitting innovations for review, the fees to be paid to those reviewing the innovations, and the fees to be charged for licensing the database. These regulations should also include guidelines for the evaluations and guidelines to be used to protect the proprietary rights of those submitting innovations for evaluation.

Section 8. Definitions:

"Innovations" shall include written and graphic representations of products, product concepts, and processes, and not include hardware or other physical prototypes of products.

Section 9. Funds in the amount of $2,000,000. shall be authorized for each fiscal year beginning in fiscal 1984 and ending in fiscal 1985. These funds shall be used to defray the start-up costs of the program If the program is not self-supporting by the beginning of fiscal 1983, it shall be sunsetted.

Re: Federal Program to Make New Inventions More Attractive and Accessible to Industry

Background

Over the past decade the rate of productivity growth in the United States has been well below that of most of the leading industrial nations, most notably Japan and Germany. One of the major reasons for this relative decline in U.S. productivity is our failure to take advantage of existing technological advances. We are reputed to be the most inventive nation on earth; however, we have not been shrewd in exploiting this innovative potential. While American industry has failed to fully capitalize on U.S. inventions, others have not. (Japan, for example, appears to be leapfrogging us in the microchip field even though the transistor and the integrated circuit -- both of which were critical to the development of this industry -- were American inventions.)

It's generally conceded that a breakdown occurs between the spawning of new ideas and getting these ideas into the hands of those in a position to best exploit them. Innovators -- individuals and business alike -- who need assistance are unable to link up with those who can provide it; industry, on the other hand, is isolated from the influx of new concepts so vital to maintaining its competitive position in the world market. The breakdown in matching inventions with users (such as manufacturers, venture capitalists, and marketing firms) occurs partly because of the lack of a clear mechanism which enables innovators to communicate their ideas to a receptive audience. Often when new concepts are presented to industry from the outside, they are met with hostility because of the "not invented here" mind-set prevalent in many U.S. firms.

Industry's reluctance to accept inventions not produced within their own confines is understandable in light of the large variation in quality among the inventions that are submitted from the outside. Many corporations just don't want to be bothered in sifting out the wheat from the chaff. Inventors,

for their part, are wary of dealing with corporate personnel because they are fearful that their ideas will be stolen or exploited without fair conpensation. The upshot of all this is that many good ideas fall into a cosmic void -- that is, if the Japenese don't snap them up first.

The Proposed self-supporting Federal program outlined below would facilitate a match between invention and industry.

Proposed Federal Program

The proposed legislation, which would be known as the Invention Evaluation and Transfer Assistance Act, would establish a screening mechanism to provide for a first-cut evaluation of new products and concepts. The evaluation would assess technical feasibility and commercial viability. Potential users of ideas would be more receptive to them after such a screening. The screening would also be designed to protect inventors' propreitary rights, making inventors receptive to it as well.

The screening would be done by recognized experts from both the academic and business communities who would be paid for their services from monies generated by the users of the program -- by those submitting ideas and those seeking ideas. The reviewers would be chosen from a list of experts in the various research disciplines whose names would be nominated by Federal agencies conducting research programs, and by an ad hoc commission appointed by the Commerce Department. Actual selection of the reviewers would be made by Commerce in conjunction with the National Science Foundation and the ad hoc commission. All reviewers would be required to sign statements of confidentiality and to use uniform criteria prescribed by the Commerce Department in assessing the inventions submitted to them.*

*The University of Oregon was one of the first places in the country to conduct a partially Federally-funded product evaluation program. As a result of this pilot program, an inventions evaluation format was developed which is now used throughout the nation as well as throughout the world. This format -- or one similar to it -- would be very useful in conducting the suggested Federal program.

The administration of the program would be decentralized by establishing at least four regional centers. (The reasons to decentralize are to make it appear a national rather than a "Washington program" and to make it more convenient for those submitting their inventions for evaluation.) These entry points would be closely monitored by Commerce and subject to centrally developed guidelines and procedures. They would be run by private sector personnel under government contract. This personnel would be responsible for preliminary screening to eliminate technically faulty inventions and for forwarding proposals to other reviewers. The activities of each of the centers would be centrally coordinated.

Once proposals are reviewed (promising ones would be assessed by 3 reviewers) and are found to meet the predetermined standards, the review sheets would be entered on a DOC database along with a generic or detailed description (depending upon the iventor's concern for his proprietary rights) of the product or product concept evaluated. (For an extra fee, inventors especially concerned about their proprietary rights could submit their ideas solely for evaluation, keeping any information about the proposal off the database. They could then use a favorable review to open doors while they sought a link-up on their own.) The database would be licensed for a fee to private sector users, such as large corporations, venture capitalists, and information service providers. These licensees could in turn allow third parties access to the database and charge them a fee, a part of which would be paid to the Commerce Department as a royalty. Commerce itself would not run an on line system; rather, it would act solely as the licensor of the database. (NTIS currently operates an information system similar to the one outlined above.)

The merit of this program is that it provides a means of making a credible first-cut evaluation of a wide variety of inventions, and also protects inventors' proprietary rights. Furthermore, it uses the private sector to promote the program because when those operating the system allow outside access, they will charge a fee, only a portion of which would be paid to the Commerce Department. The more use made of the system, the greater the benefit to all concerned -- including the economy. The program should easily pay for itself. While minimum start-up funds would be necessary, the user fees should more than pay back these costs within the first few years of the program's operation.

To Summarize: The program is designed to get new ideas into the hands of those who can use them. It does this by providing a credible screening mechanism to make these ideas more attractive. It takes into account the confidentiality concerns of inventors. It helps to overcome the "not invented here" syndrome since businesses using the system would be in the position of seeking out rather than fending off the Hun at the gate. (This, in effect, gives industry access to successful R&D projects without having to pay any overhead costs.) The screening would be only a first-stage assessment to identify the risk potential of new products. It would not, nor would it attempt to, second guess private sector marketing judgments as to the ultimate commercial possibilities of new products; rather, it is designed to encourage industry to take greater advantage of existing new concepts that have been judged by experts to be promising. This increases the likelihood that more firms will market and produce new products which, in turn, would lead to the creation of new jobs and more taxable revenue.

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Section 4.

(1) The Department of Commerce shall establish five innovation evaluation centers which shall be located at universities conducting Federally-funded research. Each of these centers shall be established in one of the Department of Commerce regions, but in no instance shall more than one center be located in any region.

(2)/(a) The innovation evaluation centers shall be run by private sector personnel under government contract. These personnel shall be responsible for receiving and for conducting a preliminary screening of innovations which are submitted to them. The preliminary screening shall be designed to eliminate technically and commercially faulty inventions. After the initial evaluation, personnel shall be responsible for forwarding innovations which appear technically and commercially promising to two independent reviewers chosen from a list of names selected by a Presidential Commission. In some instances, center personnel may find it necessary to forward innovations to outside sources for the preliminary screening.

(b) Innovations which have passed a preliminary screening and which have been judged by two independent reviewers to show significant potential as to technical and commercial feasibility shall be described, and this description, along with the reviewers' evaluations and relevant graphic representations, shall be entered on a computer terminal located at the innovation evaluation center. If the two second-stage reviewers are in disagreement as to the technical and commercial value of an innovation, the proposal will be sent to a third reviewer. If the assessment of the third reviewer is positive, that review, along with the other positive review, will be entered on the computer terminal.

(c) Fees shall be charged for both the preliminary and the second-stage screening, and all reviewers shall be paid for their services.

Section 5. The computer terminals at the innovation evaluation centers shall be connected to a central computer which shall be run and monitored by the Department of Commerce. The database of this central computer shall be licensed for a fee to the private sector. Licensees which allow third party access to the database shall pay back to the Commerce Department a portion of the fee charged by them for entry into the system. The Commerce Department itself shall not run an on-line system; rather, it shall act solely as the licensor of the database.

Section 6. A Presidential Commission which shall be under the auspices of the Commerce Department and the National Science Foundation shall be established. Commission members shall include representatives of Federal agencies conducting research and research and development programs, and members from the academic and business communities. Selection of reviewers to evaluate innovations shall be made by this Commission.

Section 7. The Department of Commerce shall issue regulations governing the fees to be assessed against those submitting innovations for review, the fees to be paid to those reviewing the innovations, and the fees to be charged for licensing the database. These regulations should also include guidelines for the evaluations and guidelines to be used to protect the proprietary rights of those submitting innovations for evaluation.

Section 8. Definitions:

"Innovations" shall include written and graphic representations of products, product concepts, and processes, and not include hardware or other physical prototypes of products.

Section 9. Funds in the amount of $2,000,000. shall be authorized for each fiscal year beginning in fiscal 1984 and ending in fiscal 1985. These funds shall be used to defray the start-up costs of the prograr If the program is not self-supporting by the beginning of fiscal 1988, it shall be sunsetted.

Guidance for the Submission
of an Energy-Related Invention Evaluation Request
to the National Bureau of Standards
Office of Energy-Related Inventions

The disclosure of an invention should include information required by NBS Form 1019, but the format may vary widely depending on a number of factors. Below are some suggestions that the inventor should consider in preparing the description of the invention to be submitted with the Evaluation Request Form 1019.

Make a Complete Disclosure. The principal requirement in submitting a request is a thorough and complete invention disclosure which describes the invention in detail. It is extremely important to submit all information which is available even if the method of presentation and orgnization is not professional in nature. Test data and information on how tests were conducted are particularly important, since no testing will be done by NBS in the evaluation.

Emphasize the Energy Relation. The program is interested in all energy-related inventions including both those that involve energy conservation and those that involve alternate sources of energy. The inventor's disclosure should emphasize and document to the extent possible, the amount of energy saved or made available through an alternate source.

Realize that it is only after the invention reaches the commercialization stage that its ultimate contribution to the solution of our energy problem can be realized. It is not necessary to calculate energy savings exactly, but the potential should be very clearly indicated.

Time to Process Your Request. Do not expect an immediate response to your request for evaluation. The evaluation process is time-consuming and there are large numbers of submittals to process. While you are waiting for an answer continue the work necessary to develop the product and search out other sources of capital. Submission of an invention to NBS for evaluation is no guarantee that it will be recommended to the Department of Energy (DOE), and a recommendation is no guarantee that you will get what you seek.

Describe Your Competition. Make an effort to find out if there are other similar products on the market. Detail the known competition and document why your invention is better technically or from an energy standpoint.

Give the Status of Your Invention. Address the question of what needs to be done to bring the invention closer to use. Indicate what you would like in the event of a favorable evaluation - support for research, development or testing; assistance for promotion or marketing; purchase and use by the Government; or simply an opinion that your disclosure describes a technically valid invention.

Emphasize the Innovative Aspect. Disclosures involving common devices, such as windmills, wave machines, furnaces, carburators, internal combustion engines, and space heaters, have already been submitted in quantity to the Bureau. Most of the ideas involved are neither new nor innovative. Be sure, therefore, to point out and highlight new principles or innovations that are involved, particularly if the invention is of a common device class.

Be Factual and Realistic. Knowledgeable technical and business-oriented people will be evaluating the proposal. Prepare the disclosure with that in mind and do not make claims which can't be justified or substantiated by data or information in the disclosure.

Disclosure Review and Analysis. The first step in the evaluation process is to determine if the disclosure describes an energy-related invention in a way suitable for evaluation. An invention disclosure will not be accepted for evaluation if:

> The potential for energy saving is not evident, or if use of or release of nuclear energy is involved.
>
> It is solely a proposal to do research and development; that is, a proposal to study an insufficiently developed idea with the hope of discovering an invention or to find a solution to a general problem.
>
> It is only a suggestion or an idea, without sufficient technical depth and detail, submitted for development by the Government.
>
> It contains obvious technical flaws; for example a perpetual motion or self-sustaining device.
>
> It proposes an extremely large-scale engineering or study project requiring an extensive evaluation to determine feasibility.
>
> It is unintelligible, unclear, or so poorly organized that an evaluator could not understand what was being presented.

Evaluation and Recommendation. NBS's responsibility is to evaluate the invention, not to determine if the resources you propose to use in developing the invention are appropriate. DOE will make that determination once the invention is recommended to them by NBS.

In preparing your disclosure, therefore, concentrate on the invention. Include information on your company and its qualifications, or on how much you propose to spend in development, only if it makes the details of your invention clearer or helps to justify your claims.

OERI Copy ***(Place carbon paper behind this sheet to make SUBMITTER's Copy of page 3)***

NBS-1019
(Rev. 2-78)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

Energy-Related Invention Evaluation Request

Follow attached instructions and submit the OERI copy of this form and other descriptive material of invention to:

Office of Energy-Related Inventions
National Bureau of Standards
Washington, D. C. 20234

(Please print or type all information)

Name and address of Inventor

Telephone No.

Name and address of Owner, if different from above

Telephone No.

This box is for office use only

Date _____ ER No. _____

Classification _____

Tech. Category _____

Analyst _____ Date _____

Request is being submitted by *(check which)*:

☐ inventor ☐ owner ☐ other

Name and address of Submitter, if not inventor or owner

Other *(identify)*

Size of company involved *(write: No. of employees / $ gross last year; N/N if none)*: _____

No. of employees *$ gross last year*

The name or title of this invention is:

Stage of invention development *(check to indicate steps completed and current status; highest number checked will indicate current status)*

0. ☐ Concept Definition 1. ☐ Concept Development 2. ☐ Lab. Test 3. ☐ Eng'g Design 4. ☐ Working Model

5. ☐ Prototype Development 6. ☐ Prototype Test 7. ☐ Production Eng'g. 8. ☐ Limited Prod./Mktg. 9. ☐ Production and Mktg.

Patent Status

0. ☐ Not patentable 1. ☐ Not applied for 2. ☐ Disclosure Document Program

3. ☐ Patent applied for 4. ☐ Patent granted (Patent Nos.: _____)

Check the item below that most nearly describes why you are requesting evaluation:

☐ 1. I wish the U.S. Government to provide funds to support development of the invention or new concept. Support is *first* needed for *(write in)*:

_____

_____

☐ 2. Development is complete. I need assistance to bring my invention or product into full utilization. Assistance is needed in: *(check whichever applies)* ☐ General Marketing ☐ Selling to the Government ☐ Business Management ☐ Other _____

☐ 3. I only desire an opinion that the disclosure describes a technically valid invention. This information is for:

☐ use in marketing ☐ use in obtaining private development support ☐ other *(specify in disclosure)*

☐ 4. The Small Business Administration suggested I request evaluation from NBS in connection with a loan application.

☐ 5. Other *(specify)* _____

_____

☐ Yes ☐ No Has the invention been described to other agencies of the Government? *(If yes, discuss in disclosure.)*

☐ Yes ☐ No Has the invention been disclosed to any private companies, patent attorneys, etc.? *(If yes, identify in disclosure.)*

Place carbon paper behind this sheet to make Submitter's Copy of page 4.

MEMORANDUM OF UNDERSTANDING

I have read the Program Description and Statement of Policy on pages 1 and 2 of this form. As the owner, or with the authority from the owner who is listed on Page 3, I have attached (or previously submitted) a disclosure of the identified invention for the purpose of evaluation by the National Bureau of Standards (NBS) pursuant to Section 14 of Public Law 93-577.

I understand that to protect property rights an appropriate legend should be applied to the title page or first page of the disclosure, and that if the disclosure is so marked, the Government will consider all information *that is in fact* (a) trade secret or (b) commercial or financial information that is privileged or confidential, as coming within the exemption set out in 5 U.S.C. 552(b) (4). Accordingly, I have checked directly below, the box which is applicable to this disclosure.

Yes No

☐ ☐ The appropriate legend has been applied to the disclosure.

☐ ☐ Please apply the appropriate legend to the previously submitted disclosure to which this request pertains.

☐ ☐ The legend is not required because the disclosure does not contain such information.

I also understand that NBS will evaluate the invention described in the invention disclosure on the following conditions:

(a) The Government will, in the evaluation process, restrict access to the disclosure to those persons, within or without the Government, who have a need for purposes of administration or evaluation and will restrict their use of disclosure information to such purposes.

(b) The disclosure will not be returned and may be retained as a Government record.

(c) The Government may make additional copies of the disclosure if required to facilitate the review process.

(d) The acceptance of the disclosure does not, in itself, imply a promise to pay, a recognition of novelty or originality, or a contractual relationship such as would render the Government liable to pay for use of the information in the disclosure.

(e) The provisions of this Memorandum of Understanding shall also apply to additions to the disclosure made by me incidental to the evaluation of the disclosure.

Date	Signature
Status *(Owner, Business or Company Representative, Patent Attorney, Interested Party, etc.)*	Printed or Typed Name

U. S. Department of Commerce
National Bureau of Standards

OFFICE OF ENERGY-RELATED INVENTIONS

REQUEST FOR EVALUATION OF AN ENERGY-RELATED INVENTION

Instructions for Submission of Invention Disclosures for Evaluation using Form NBS-1019.
After reading this page and the following page, complete page 3 of both OERI and Submitter copies. Check appropriate box on page 4 and sign, date and complete the Memorandum of Understanding. Retain the Submitter's Copy for your records. Detach the OERI copy (pages 3 and 4) and send with your invention disclosure to:

Office of Energy-Related Inventions
National Bureau of Standards
Washington, D.C. 20234

A written disclosure of your invention, *in the English language,* must be attached to the OERI copy. Drawings, where appropriate, should be included. Copies of patents should be provided. Models are not required and will not be accepted. Receipt of your submission will be acknowledged. Keep a copy of your disclosure because the one submitted to OERI will not be returned.

Since the quality of the evaluation will depend upon your submission, the invention disclosure should include or cover the following:

(1) **Purpose** of the invention. Include a discussion, if appropriate, of where it can be used to best advantage; for example, which industry or industrial process? by individuals? by the Government? Emphasize the energy conservation or production potential.
(2) The **existing method(s)**, if any, of performing the function of the invention. Disadvantages of the existing method(s).
(3) The **new method**, using your invention. Details of the operation of the invention, identifying specific features which are new. If the invention is conceptual in nature, discuss typical applications.
(4) **Construction** of the invention, showing changes, deletions, improvement over the old method(s).
(5) **Data and calculations.** If tests have been conducted, detail the test conditions, controls, and results. Energy savings or efficiency estimates should be documented by calculations and data if available. Theoretical analyses should include the pertinent equations, definitions of terminology and references.
(6) **Status of development:** Include information on stage of research, development, preproduction or production. Discuss proprietary nature, circumstances of public disclosure, instances of disclosure to government agencies, etc.
(7) **Difficulties** encountered or to be expected in exploiting your invention. Reasons why it has not been patented, manufactured, used, or accepted. What needs to be done to bring the invention closer to use?

Program Description and Statement of Policy

The Federal Nonnuclear Research and Development Act of 1974 (Pub. L. 93-577) recognized the importance of encouraging invention and innovation in a national energy program. Section 14 of the Act directs the National Bureau of Standards (NBS) to give particular attention to the evaluation of promising energy-related inventions, particularly those from individual inventors and small companies. The Office of Energy-Related Inventions (OERI) was established at NBS to carry out the provisions of Section 14. Its duties include conducting analyses of submitted inventions to determine their technical and commercial feasibility for saving or producing energy, and bringing noteworthy concepts to the attention of the Department of Energy (DOE).

The principal objective of the OERI effort is to assist DOE in identifying inventions that are ready to be moved into the private sector but may require business management assistance, or inventions that require further research and development (R&D), prototype fabrication, or laboratory tests in order to bring them to the point where they can compete with other DOE projects for program R&D funds. The evaluation of inventions submitted will, therefore, be performed principally as a service to DOE. Thus, the outcome of an evaluation will be either a recommendation for action by DOE in connection with the invention, or notification to the inventor that his invention is not being so recommended.

A decision not to recommend action by DOE does not necessarily mean that the invention is considered scientifically unsound or without practical value. Also, a favorable evaluation by OERI should not be construed as being a ruling as to the patentability of any feature of an invention. The inventor should apply for a patent whenever such action is thought to be appropriate. OERI will provide no assistance in filing or prosecuting patent applications. Inventors interested in patent protection should discuss the matter with a registered patent attorney or agent. It should be noted that a recommendation by OERI is no guarantee that DOE will provide assistance in developing a given invention.

To safeguard such proprietary rights as may exist in a submission, OERI will restrict access to invention disclosures to those persons having a need for purposes of administration or evaluation. Accordingly, in accepting invention disclosures for evaluation, an explicit statement is required (see page 4) that the information does or does not come within one of the exemptions of the Freedom of Information Act. If, for example, the disclosure contains information that is (a) a trade secret or (b) commercial or financial information that is privileged or confidential, such information falls within the exemption that is set out in 5 U.S.C. 552(b)(4). Thus, if the disclosure is protectable, the following or a similar legend should be applied to the title page or first page of the disclosure: "The disclosure contains information which is (a) a trade secret or (b) commercial or financial information that is privileged or confidential."

The Privacy Act of 1974 (Public Law 93-579), 5 U.S.C. 552a, requires that you be provided with certain information in connection with this form. You should know that:

a. The authority for collecting this data is the Federal Nonnuclear Energy Research and Development Act of 1974 (Public Law 93-577).
b. The furnishing of the information is entirely voluntary on your part.
c. The principal purpose for which the data will be used is to conduct an evaluation of your invention to determine its technical validity and potential for saving or producing energy.
d. The routine uses which may be made of the information submitted in this form are as follows:
   1) Disclosure to those employees of the Office of Energy-Related Inventions or other Federal agencies having need for the information, either to perform evaluations or administer the evaluation program.
   2) Disclosure to a contractor of the National Bureau of Standards having need for the information in the performance of a contract to perform evaluations of inventions and having agreed to hold the information in confidence.
   3) Disclosure to a Member of Congress submitting a request involving your invention, when you have requested his assistance thereon.
   4) Disclosure to any persons with your written authorization.

SUBMITTER's Copy ***(Keep this copy and return original OERI Copy with disclosure)***

NBS-1019
(Rev. 2-78)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

Energy-Related Invention Evaluation Request

Follow attached instructions and submit the OERI copy of this form and other descriptive material of invention to:

Office of Energy-Related Inventions
National Bureau of Standards
Washington, D. C. 20234

(Please print or type all information)

Name and address of Inventor

Telephone No.

Name and address of Owner, if different from above

Telephone No.

Request is being submitted by *(check which)*:

☐ inventor ☐ owner ☐ other

Name and address of Submitter, if not inventor or owner

Other *(identify)*

Size of company involved *(write: No. of employees / $ gross last year; N/N if none)*: _____ *No. of employees* _____ *$ gross last year*

The name or title of this invention is:

Stage of invention development *(check to indicate steps completed and current status; highest number checked will indicate current status)*

0. ☐ Concept Definition 1. ☐ Concept Development 2. ☐ Lab. Test 3. ☐ Eng'g Design 4. ☐ Working Model
5. ☐ Prototype Development 6. ☐ Prototype Test 7. ☐ Production Eng'g. 8. ☐ Limited Prod./Mktg. 9. ☐ Production and Mktg.

Patent Status

0. ☐ Not patentable 1. ☐ Not applied for 2. ☐ Disclosure Document Program
3. ☐ Patent applied for 4. ☐ Patent granted (Patent Nos.: _____)

Check the item below that most nearly describes why you are requesting evaluation:

☐ 1. I wish the U.S. Government to provide funds to support development of the invention or new concept. Support is *first* needed for *(write in)*:

_____

_____

☐ 2. Development is complete. I need assistance to bring my invention or product into full utilization. Assistance is needed in: *(check whichever applies)* ☐ General Marketing ☐ Selling to the Government ☐ Business Management ☐ Other _____

☐ 3. I **only** desire an opinion that the disclosure describes a technically valid invention. This information is for:
☐ use in marketing ☐ use in obtaining private development support ☐ other *(specify in disclosure)*

☐ 4. The Small Business Administration suggested I request evaluation from NBS in connection with a loan application.

☐ 5. Other *(specify)* _____

_____

☐ Yes ☐ No Has the invention been described to other agencies of the Government? *(If yes, discuss in disclosure.)*

☐ Yes ☐ No Has the invention been disclosed to any private companies, patent attorneys, etc.? *(If yes, identify in disclosure.)*

Tear off along perforation and return only original OERI copy (pages 3 and 4) with the disclosure.

MEMORANDUM OF UNDERSTANDING

I have read the Program Description and Statement of Policy on pages 1 and 2 of this form. As the owner, or with the authority from the owner who is listed on Page 3, I have attached (or previously submitted) a disclosure of the identified invention for the purpose of evaluation by the National Bureau of Standards (NBS) pursuant to Section 14 of Public Law 93-577.

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Yes No

☐ ☐ The appropriate legend has been applied to the disclosure.

☐ ☐ Please apply the appropriate legend to the previously submitted disclosure to which this request pertains.

☐ ☐ The legend is not required because the disclosure does not contain such information.

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(b) The disclosure will not be returned and may be retained as a Government record.

(c) The Government may make additional copies of the disclosure if required to facilitate the review process.

(d) The acceptance of the disclosure does not, in itself, imply a promise to pay, a recognition of novelty or originality, or a contractual relationship such as would render the Government liable to pay for use of the information in the disclosure.

(e) The provisions of this Memorandum of Understanding shall also apply to additions to the disclosure made by me incidental to the evaluation of the disclosure.

_____ _____

Date Signature

_____ _____

Status Printed or Typed Name

(Owner, Business or Company Representative, Patent Attorney, Interested Party, etc.)

GPO : 1982 O - 366-338

Paper No. ICTTE-82-132

THE INTERNATIONAL CONGRESS ON TECHNOLOGY AND TECHNOLOGY EXCHANGE

PITTSBURGH, PENNSYLVANIA

MAY 3, 4, 5, 6, 1982

TITLE EVALUATION OF NEW TECHNOLOGY

AUTHORS George P. Lewett, Chief

COMPANY Office of Energy-Related Inventions
National Bureau of Standards
Washington, D.C. 20234

EVALUATION OF NEW TECHNOLOGY

Introduction

Since 1975 the Office of Energy-Related Inventions (OERI) at the National Bureau of Standards (NBS) has been evaluating energy-related inventions submitted by independent inventors and small businesses who are seeking support from the Department of Energy (DOE) to develop or market the inventions.

To qualify for support under the program, the invention or new product needs to be technically and commercially feasible and new in the sense that it offers an unrealized potential for saving energy or increasing the supply of energy; it may or may not be new in the patentable sense. The invention need not be patented and may be in any stage of development.

As of the end of calendar 1981, 17,746 evaluation requests had been submitted to OERI. Of these, about half were acceptable for evaluation; i.e., found to be within the scope of the program and sufficiently developed and described to qualify for evaluation. Almost 200 had been recommended by OERI to DOE for support. Over 100 had been awarded grants by the DOE Support Office, totaling approximately $9,000,000.

In this paper I would like first to describe the evaluation process and document our evaluation experience. I then wish to present findings relative to characteristics of "evaluation" as a principal element in the process of technological innovation. The findings should be of interest to companies, new venture organizations, and financing sources, who are faced with the problem of reviewing new ideas or products and identifying those suitable for investment.

The Evaluation Process

In the Energy-Related Inventions Program (ERIP), an invention can be submitted to OERI for evaluation at any time. Evaluation and grant award is a continuous process. There is no fee for evaluation. The Program is designed principally for use by independent inventors and very small businesses.

When a request for evaluation is received by OERI, the invention disclosure is reviewed and either accepted for evaluation or not. It is not acceptable if it is not energy-related, is concerned with nuclear energy production or use, is obviously fallacious (perpetual motion, for example), or if the disclosure is insufficient to enable evaluation.

Evaluation is conducted in two stages by OERI staff engineers, utilizing the consulting services of 8 contracting firms and a large

number of individual consultants. Consultants are added and subtracted from our list continually, as invention subject areas change and in response to staff assessment of consultant performance. The current list of consultants contains some 250 names, including scientists and engineers who are in private professional practice, and who are on the faculties of some 55 different universities. Technical expertise represented ranges through the entire spectrum of energy technology.

OERI staff engineers are selected on the basis of technical competence, experience in the private sector, and demonstrated engineering judgment. Decisions to recommend or reject are made on the basis of staff engineering judgment and the material submitted by the inventor, utilizing the opinions and analysis provided by the consultants. No testing is performed. In the interest of liberality, the decision process is deliberately unstructured in the sense that no check-off lists, quantitative limits, or polling practices, are utilized.

Technical soundness, potential energy impact, and commercial feasibility are the criteria for decision. The entrepreneurial or developmental capabilities of the inventor or other people involved are not evaluated; the focus is entirely on the technology. DOE in analyzing the support requirements takes the non-technological factors into account.

The first-stage of evaluation is designed as a technical screen to surface those inventions which seem sufficiently "promising" to warrant in-depth evaluation at the second-stage level. The invention disclosure is reviewed first by a staff engineer who selects a consultant and sends the disclosure to him for an opinion. The consultant is requested to examine the disclosure only to the extent necessary to gain a good understanding of what the invention is expected to do and how it is to be accomplished, and then to comment briefly (1 page) on technical, commercial, or practical aspects. He is also to provide a brief description of the invention as he sees it and recommend "Support" or "Non-Support." He is instructed to be liberal and informal, and he is not to elicit or incorporate any supervisory or peer opinions.

On receiving the consultant review, a staff evaluator (who may not be the same as the one who saw the invention first) selects a second consultant and obtains a second opinion; the second reviewer is not informed of the first reviewer's opinion. This process is repeated as necessary until a staff evaluator makes the decision to reject the invention or enter it into second-stage evaluation. Two consultant reviews are the norm.

At the second-stage level, the staff evaluator selects a consultant to conduct an analysis and prepare a formal report. The consultant is encouraged at this level to contact the inventor and visit his

facility if he feels it advisable. Usually only one consultant analysis is conducted at the second-stage level.

If the invention is recommended, a report is prepared which includes the material submitted by the inventor, the second-stage reviewer report, and a summary and analysis by the OERI staff coordinator.

If the invention is rejected at the first-stage level, the inventor is notified by a letter giving reasons for rejection using findings of both staff and consultant reviews. If rejected at the second-stage level the consultant's report is also enclosed with the letter. Inventors who are turned down are encouraged to refute negative findings, submit new information, and request reconsideration. Evaluation can be reopened at any time, and proceeds from the point at which it was concluded earlier. A significant percentage of recommended inventions are rejected at least once and recommended as a result of reopening the evaluation.

Evaluation Results

Figure 1 presents flow statistics since inception of the Program in April 1975. The percentage of inventions recommended is referred to as "process yield" and estimated as the product of: the proportion of inventions accepted for evaluation, the proportion of accepted

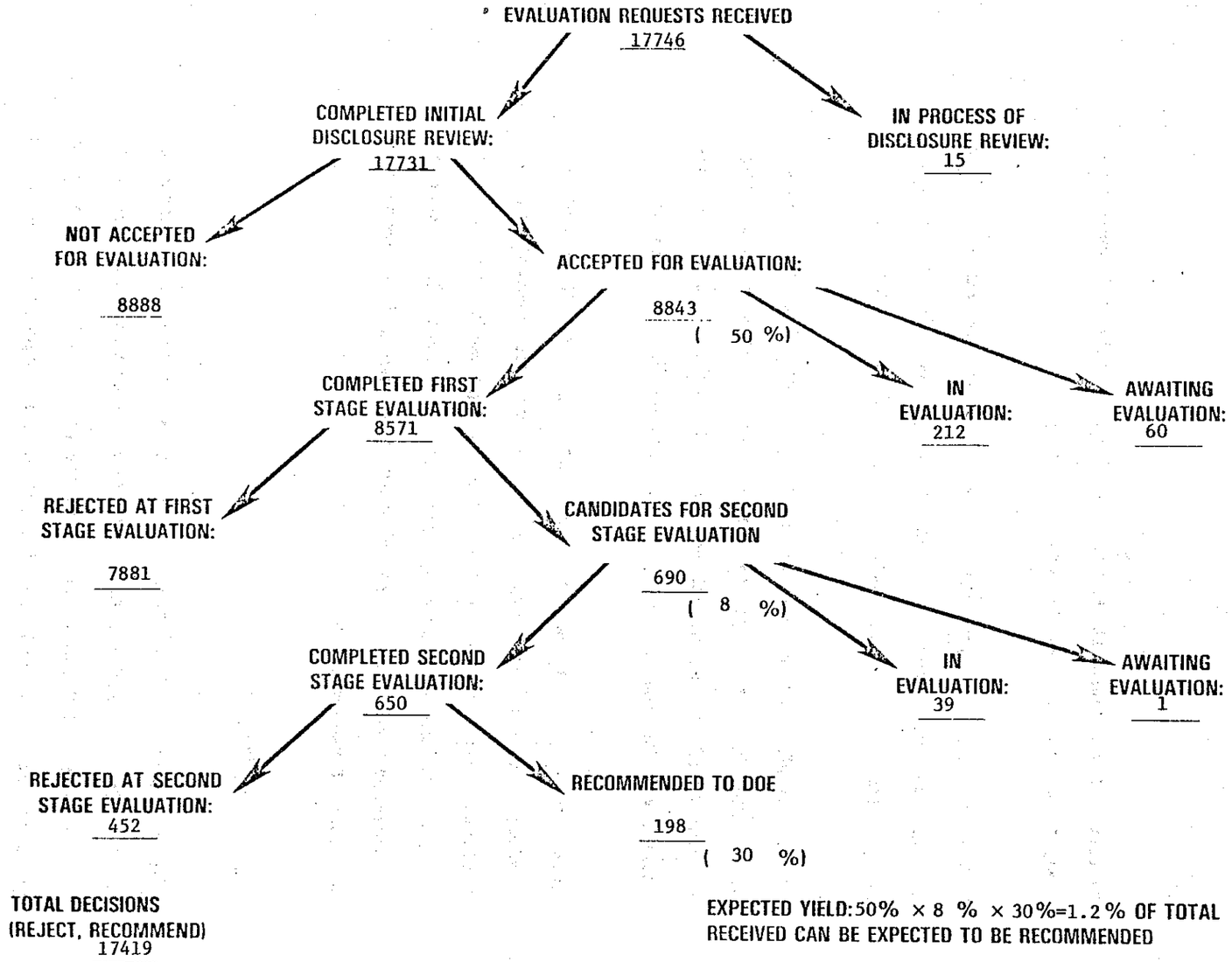

FIGURE 1
Evaluation Process Statistics: April 1975-December 1981

inventions which reach second-stage; and the proportion recommended of those completing second-stage.

Figure 2 illustrates the range of technologies evaluated and shows how the yield differs by invention subject area.

The data of Figure 3 further describe the population of inventions and inventors involved. Inventions evaluated are seen to be in every stage of development, from the conceptual through new product introduction. Clearly the population served by the Program is at the lowest end of the small business spectrum, including the individual as, in effect, a small business with 1 employee.

Figure 4 summarizes Department of Energy activity to support further development of the recommended inventions. A Program evaluation effort has been initiated to determine the final outcomes resulting from such support. Preliminary results from this evaluation effort indicate that a substantial proportion (1/3 to 1/2) of the recommended and supported inventions are likely to be "successful" in the marketplace.

Recently recommended and supported inventions are as follows:

- A method by which an applied voltage causes a reflective aluminized mylar film to unroll and press flat against a window.

EVALUATION PROGRESS REPORT BY INVENTION CLASS AS OF DECEMBER 31, 1981

CLASSIFICATION	EVALUATION REQUESTS RECEIVED	ACCEPTED FOR FIRST-STAGE	COMPLETED FIRST-STAGE	ACCEPTED FOR SECOND-STAGE	COMPLETED SECOND-STAGE	RECOMMENDED	% OF TOTAL RECEIVED	% OF TOTAL EXPECTED TO BE RECOMMENDED**
Fossil Fuel Production	369	273	269	65	59	19	2.1	5.8
Direct Solar	2087	1143	1114	69	66	14	11.8	0.7
Other Natural Sources	2594	1034	1006	60	58	14	14.6	0.6
Combustion Engines & Components	2019	1249	1189	80	74	13	11.4	0.7
Transportation Systems, Vehicles & Components	1524	906	875	55	51	13	8.6	1.0
Buildings, Structures & Components	2986	2211	2135	126	117	40	16.8	1.5
Industrial Processes	942	723	706	159	151	57	5.3	6.4
Miscellaneous	2121	1223	1197	76	73	28	12.0	1.4
Out of Scope & Unclassifiable	3089	81	80	0	0	0	17.4	0.0
TOTALS	17731*	8843	8571	690	649	198	100.0	1.2

* Excludes 15 not yet classified. (Disclosure Review not completed).

**For Example: Fossil Fuel Production $\frac{273}{369} \times \frac{65}{269} \times \frac{19}{59} \times 100 = 5.8\%$

FIGURE 2

Invention Stage of Development (6/1/78-11/1/81)

Stage of Invention Development	Cumulative % of Total Inventions: All Evaluated	Reaching 2nd Stage	Recommended	Actual % Recommended
Concept Definition	17.4	5.6	3.3	3.3
Concept Development	43.3*	23.5	18.3	15.0
Laboratory Test	47.1	29.1	25.0	6.7
Engineering Design	56.7	45.0	35.0	10.0
Working Model	71.3	55.8	45.0	10.0
Prototype Development	78.7	65.1	60.0	15.0
Prototype Test	89.0	82.0*	70.0	10.0
Production Engineering	91.0	85.6	73.3	13.3
Limited Production & Marketing	96.5	94.9	96.7*	23.4*
Production and Marketing	100.0	100.0	100.0	3.3
Total Inventions in Category**	4332	195	60	60

*Stage with largest number of inventions (mode)

Size of Company Involved (6/1/78-11/30/81)

Number of Employees	% of Inventions: All Evaluated	Reaching 2nd Stage	Recommended
0 - 1	90.6	77.2	76.9
2 - 20	7.9	19.1	18.5
21 - 100	1.0	2.2	1.5
> 100	.5	1.5	3.1
Total Inventions in Category**	4684	272	65

**Inventions for which data had been provided by inventor on application form.

FIGURE 3
Inventions/Inventors Population Data

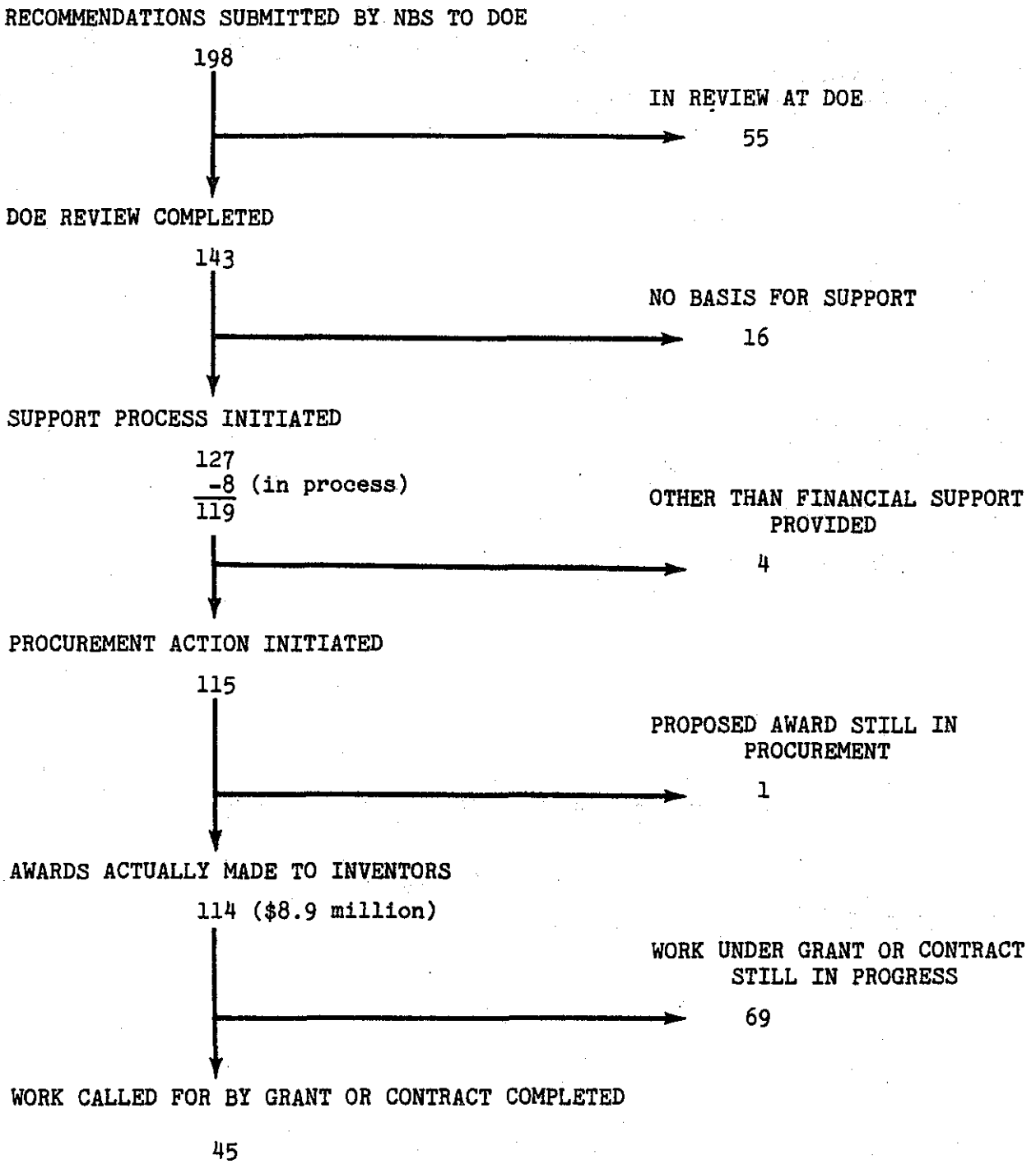

FIGURE 4
DOE Activity in Supporting NBS-Recommended Inventions (April 1975-December 1981)

In winter the film can be rolled up to let the sunlight in during the day, and rolled down to hold heat in at night. This process can be reversed in summer. A grant award in the amount of $99,500 was made to design, build, and test a demonstration model of the "Dielectric Windowshade."

- A furnace for the melting of reactive metals and semi-conductors, which need to be obtained in high purity form. It employs high frequency heating in a manner that allows the metal being melted to form its own crucible. An award in the amount of $121,554 was given to build and test a prototype furnace for the production of silicon for solar cells.

- An otherwise conventional, universal, external cylindrical grinder retrofitted with a computer control to save energy in removing metal. A grant in the amount of $99,328 was given to complete engineering design and test a prototype.

- A continuously-variable hydraulic positive-displacement transmission with lockup, overdrive, and regenerative braking for automotive and other vehicular uses. A grant in the amount of $95,000 was awarded to design, build, and test a prototype installed in a Volkswagen Sirocco.

- A metal casting method for hollow parts. A grant in the amount of $108,920 was awarded to construct and test a working model to demonstrate the heatless production of hollow-cast parts.

- A hydrogen concentration cell which converts solar energy to electricity by using heat to generate the gas pressure to drive the cell, in effect an electrochemical heat engine with sunlight furnishing the heat. An award in the amount of $67,868 was given to build and test a laboratory model so as to determine efficiency and feasibility.

Evaluation As An Element in the Innovation Process

Figure 3 lists 10 stages in the development of a concept into a marketed product. For purposes of this paper we will define "evaluation" as the process which governs transition from one development stage to the next. That is, in evaluation as we are to discuss it, a decision is to be made to continue development towards commercialization, or not. The decision is to be made responsibly, i.e., with knowledge and concern that action is to be taken as a result, usually involving commitment of funds at risk if the decision is to continue development.

In this view of "evaluation" the evaluator's principal role is that of a decision-maker. While he may, after the evaluation, provide

information to justify his decision or perform a secondary role as a consultant or "sounding-board," his function is to pass or not pass (recommend/not recommend) the submitted concept, invention, process or product into the next stage of development.

There is need to thus distinguish "evaluation" as a transition point in the innovation process, from "evaluation" as a service provided for a fee or in the public interest. In a service operation there is no commitment to invest if the evaluation is positive; the evaluation results are provided only to the inventor to serve the inventor's purposes.

Very few inventions or new ideas are practical and will be successful if brought to market. Further, of, say, 1000 ideas proceeding through the 10 stages of development, most will fall out at one stage or the other along the way, and of those reaching production and marketing, only a fraction will "live" for any length of time. Actual numbers passing an evaluation point will depend on many factors--a principal one (given that the technology is sound) probably being the people involved in the idea development; i.e., the inventors, entrepreneurs, development engineers, managers, etc. In this discussion we wish to disregard or hold constant the "people" factor, as well as the many socio-political-economic factors, and focus only on two factors:

- the quality of the invention or new idea as measured somehow in intrinsic merit--technical soundness and feasibility, practicality, marketability, etc.

- the design features and operating characteristics of the evaluation process, method, or system.

If, simplistically, we assume that a particular invention or new product can be characterized as "Good" or "Not Good", in the sense that it will or will not be a "success" if identified and brought to market, we can depict the most accurate or ideal result of an evaluation process as in Figure 5A, "g" being the number of good inventions submitted for evaluation. Unfortunately a process able to deliver the results of Figure 5A is probably unattainable since in effect the evaluator is seen to be infallible.

Figure 5B represents a more practical viewpoint--we know extraordinarily "good" inventions are not always recognized by potential investors (counted in "a" in Figure 5B); and we know that we usually have to be liberal in our evaluation procedures to insure that we don't miss too many good inventions (extent of liberality measured by the size of "b" in Figure 5B).

The accuracy of an evaluation process can be defined as $(g-a) \div g$. The ratio $(g-a) \div (g-a+b)$ is also of interest as a measure of process performance and will be referred to as the "discrimination" of the process.

There are many processes which could conceivably be analyzed and compared on the basis of the simple model of Figure 5. Our process in OERI certainly can be, as could the operation of a venture capital firm actively searching for ventures. Conventional Government procurement or grant programs may not fit the model however, since their evaluation usually involves simultaneous assessment of relative merits of a fixed number of items (proposals) to be evaluated, rather than assessment of intrinsic merit on a continuous case-by-case basis.

The reason for the above discussion is to provide a framework for presenting findings and commenting from our experience. To sum up the discussion, Figure 5C illustrates our estimates of OERI's performance in the model format. The marginal first column total of .015 corresponds of course to the evaluation process yield discussed earlier. We hope in the future to be able to develop an estimate of "a'," the fraction of good inventions we miss in the evaluation process; at this point all we can say is that it is probably very small, on the order of .0005.

5A IDEAL CASE
Evaluation Process Finding

		Good	Not-Good	Totals
Actually	Good	g	0	g
	Not-Good	0	1000-g	1000-g
	Totals	g	1000-g	1000

5B GENERAL CASE
Evaluation Process Finding

		Good	Not-Good	Totals
Actually	Good	g-a	a	g
	Not-Good	b	1000-g-b	1000-g
	Totals	g-a+b	1000-g+a-b	1000

5C ESTIMATED AVERAGE OERI PERFORMANCE
Evaluation Process Finding

		Good	Not-Good	Totals
Actually	Good	.005	a'	.005+a'
	Not-Good	.010	.985-a'	.995-a'
	Totals	.015	.985	1.000

FIGURE 5 EVALUATION PROCESS MODEL

Major Findings

The current design of the evaluation process evolved over a period of several years. Two features which developed gradually are seen to be of particular interest in their effect on accuracy and discrimination of the process as the two terms are defined above. These are:

(1) The Gatekeeper Role of the OERI Staff Evaluator. With the very wide variety of invention subject areas submitted, use of consultant experts was seen to be essential from the beginning of OERI operation. However, it quickly became clear that decisions could not be made solely on the basis of the consultant opinions. In spite of careful consultant selections their opinions were not always sufficient for decision, did not always agree, and at times were incorrect.

The staff evaluator was required to add another dimension via job-developed characteristics and abilities. The single most important characteristic seems to be the traditional professional engineers' ability to make a decision on the basis of engineering judgment with a limited amount of information and in the face of uncertainty. In addition, the competent staff evaluator, who is selected as a highly competent technologist to start with, not only develops considerable technical breadth and state-of-the-art knowledge, but also unique abilities and skills in gathering and integrating information pertinent to decision.

I've used the term "gatekeeper" in referring to the staff evaluator because it seems so appropriate and describes the pass/not-pass function so precisely. Nevertheless, while the function here differs from the "information gatekeeper" function defined by Allen[1], there are some similarities and some reason to believe that people who perform well as evaluation-type gatekeepers, will also perform well as information gatekeepers and/or vice versa.

Figure 6 summarizes consultant statements on invention merit versus OERI staff evaluator decisions. In first-stage evaluation each consultant is requested to comment and make a recommendation for "Support" or "No Support" of the invention. As noted earlier the process is such that opinions are solicited independently from one or more consultants until the OERI staff evaluator feels he has sufficient information to make a decision to pass the information into second-stage evaluation or not. The tabulation shows that decision may require as many as 4 consultant reviews. In Figure 6A are tabulated the consultant recommendations, in first-stage evaluations, for those inventions which were eventually recommended by OERI to DOE for support. The number 31 under column 1 and in row 1 indicates that in 31 cases, 1 consultant recommended "Support" and another "No Support." The number 20 under column 2 and in row 1 indicates that in 20 cases, 2 consultants recommended "Support" and 1 consultant recommended "No Support."

From Figure 6A it is seen that while agreement among or between consultants is frequent, disagreement is also frequent. They were unanimous for Support in less than half the cases (48%), and unanimous against 13.5% of the time.

In Figure 6B are tabulated the consultant opinions for inventions which were turned down in first-stage evaluation. Again, that disagreement is frequent is also clear. Here, however, unanimity occurred 83.6% of the time with respect to Non-Support, and 1.5% of the time with respect to Support.

Generally, it would seem that the consultants find it easier to say "No--(don't support)" than "Yes," based largely on the unanimity differences between Figures 6A and 6B. However, the principal point of interest is the significance of the OERI staff evaluator's role as decision-maker. Clearly if decisions were made by vote or other means, as many as half the recommendations would probably not have been made to DOE, and a significant number of those turned down by the OERI staff evaluator would have been recommended.

It was noted earlier that about 1/3 to 1/2 of NBS-recommended inventions are expected to be "successes." For those felt to be successes at this point, first-stage consultant opinions seem to show basically the same pattern depicted in Figure 6A. The conclusion is that "good" inventions are not easily recognized.

6A NUMBER OF INVENTIONS RECOMMENDED BY OERI
Tabulation of Consultant Opinions in First-Stage Evaluation

Number of Consultants Who Said "No Support" In Each Case	Number of Consultants Who Said "Support" in Each Case: 0	1	2	3	Total Inventions	Percentage
0	-	34	35	2	71	48.0
1	6	31	20	1	58	38.5
2	12	5			17	11.5
3	1	1			2	1.3
4	1				1	0.7
Total Inventions	20	71	55	3	149*	
Percentage	13.5	48.0	37.2	1.3		100.0

*Excludes inventions recommended after an initial rejection, and inventions not reviewed by consultants at first-stage level.

6B NUMBER OF INVENTIONS REJECTED BY OERI
Tabulation of Consultant Opinions in First-Stage Evaluation

Number of Consultants Who Said "No Support" In Each Case	Number of Consultants Who Said "Support" in Each Case: 0	1	2	3	Total Inventions	Percentage
0	-	60	54	5	119	1.5
1	2030	776	60		2866	33.9
2	4342	299	16		4657	58.3
3	279	37			316	4.0
4	30				30	0.3
Total Inventions	6681	1172	130	5	7988	100.0
Percentage	83.6	14.7	1.6	.1		100.0

FIGURE 6 Consultant Opinions in First-Stage Evaluations

That use of a "gatekeeper", i.e., one informed decision-maker, makes generally such a difference is not too surprising. We anticipated this somewhat by ruling against committee-type decision-making among consultants as well as within OERI, from the beginning. The extent of the effect in improving accuracy and discrimination however, is surprising, particularly that in 13.5% of the recommendations, consultants were unanimously negative.

(2) Wide-Open Appeal Process. Evaluation processes generally, including those which are part of conventional Government procurement or grant programs, as well as those operated by large companies and venture organizations, are designed to avoid or minimize confrontation and argument after the fact of a negative evaluation. The reason for this may have been originally to minimize costs; and the design practice then continued by rote. Nevertheless, such design practice seems to me to be dictated more as a defense mechanism, illustrating the natural reluctance of an evaluative authority to reverse a decision once made or opinion once given.

I believe this because in initial design of the OERI process, we gave much thought and initiated some practices to discourage inventors from corresponding subsequent to our turning them down; we were concerned about costs involved in responding. There would have been no need to do that if the Program was run along conventional lines; i.e., with a fixed procurement period in which the "best" submissions were awarded grants; as noted earlier the ERIP evaluation and grant award process is continuous and evaluation/award is on the basis of

intrinsic merit.

Because of the continuous-process design, and the fact that we were operating with public funds, we were unable to maintain a policy or practice of avoiding confrontation and argument after the fact of a negative evaluation. To be responsive we found it necessary to operate in a mode under which we will reconsider and reevaluate at any time with receipt of new information. With experience we have since found it not only necessary but advisable to provide for such a feature: the net result of the appeal and reevaluation process has been an increase in yield of approximately 20%.

The inventor participant in the Program can initiate an appeal; i.e., request reconsideration, after any decision point in the evaluation process. Appeals can be initiated repeatedly, and reevaluation can result in each case; in effect the decisions are never irrevocable nor is the appeal process ever terminated by OERI. A decision is made and the inventor notified after each appeal.

Figure 7 provides data on the incidence and results of cases where inventors have appealed, that is, responded to our rejection with a request for reconsideration.

Reasons for turnaround on our part, that is recommendation after initial rejection and reconsideration, are varied. In almost every

	PROCESS DECISION LEVEL		
	ACCEPT/ NOT ACCEPT	1ST STAGE EVALUATION	2ND STAGE EVALUATION
NO. ORIGINALLY REJECTED	8805	8843	650
NO. APPEALED	1066	1567	168
NO. STILL IN PROCESS	9	144	15
ORIGINAL DECISION CONFIRMED:			
AT ACCEPT/NOT ACCEPT LEVEL	906	-	-
AT 1ST STAGE EVALUATION LEVEL	143	1347	-
AT 2ND STAGE EVALUATION LEVEL	7	50	145
NO. RECOMMENDED	1	26	8

FIGURE 7 - Results of Appeal Process

case, however, where such a turnaround has occurred, the inventor submitted additional substantive information, which was provided in response to problems identified or objections made by evaluators. Reconsideration or reevaluation without submission of additional information seemed to have no effect, suggesting that turnaround was not simply a matter of correcting an evaluator error or misunderstanding.

Improved communications, particularly including evaluator-inventor dialogue, seems to be a principal factor in causing turnaround. Generally the inventor or small company makes a very poor case for the invention. The idea or details of operation are not described well, and information provided is insufficient or fails to focus on and clarify important points. The appeal process and submission of additional information very naturally compensates for this.

In some cases the inventor makes a direct design change or modification in response to OERI findings, and the improvement removes the objection to recommendation. More often, however, the inventor carries development a step further in order to validate claims which we question; this then leads to design changes as a result of the further development. Resubmissions to OERI at the later stage of development, with the appropriate documentation, then provides a basis for turnaround.

Regardless of the reasons or mechanics of turnaround, the open appeal policy is seen to be a highly valuable feature of the evaluation process in its effect on increasing yield. It would seem also to have a strong positive effect on the ability of staff evaluators to maintain objectivity and develop the self-confidence necessary for effective performance. The tendency to become defensive when forced to say "no" as often as OERI evaluators do in a continuous flow of inventions, which are thought by the inventor to be good, is a very natural one. The open appeal process requires the evaluator to deal with this tendency directly and rationally; i.e., by accepting and even encouraging confrontation, with the knowledge that he is free and even willing to be convinced.

[1]Thomas J. Allen, "Managing the Flow of Technology: Technology Transfer and the Dessemination of Technological Information within the R & D Organization", pp. 141-180, The MIT Press, Cambridge, MA (1979)