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TECHNOLOGY ASSESSMENT IN THE PRIVATE SECTOR: SOME
FINDINGS OF POTENTIAL USE TO OTA*

DRAFT PAPER

January 9, 1981

James D. Maloney, Jr.

* The opinions expressed in this report are solely those of the author and do not reflect the views of OTA.

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I. INTRODUCTION

In its effort to fulfill its mission as completely as possible, the Office of Technology Assessment has undertaken several internal and external analyses of the process of technology assessment within private industry and governmental agencies. This report is submitted as one part of that effort. It is based upon the experience of Midwest Research Institute (MRI) in surveying the private sector to determine their activities in technology assessment.¹ It is also based on discussions with OTA personnel to examine how OTA conducts its assessment process.

There are three purposes underpinning this effort. The first purpose was to review the process for completing assessments within OTA. The second purpose was to survey current activities and future corporate directions for technology assessment in the private sector. These two purposes then led to the third purpose, which was to undertake a comparison of the private sector and OTA activities. Particular emphasis was placed on trying to identify those issues where OTA might learn something from private sector technology assessment.

The structure of this report, then, is as follows. First, there is a review of how technology assessment is initiated within OTA. After this, the paper briefly reviews the current activities and issues of concern in private sector technology assessment. The third section of the report gives a comparison of the OTA and the private sector systems for structuring and completing assessments. The next section of the report briefly discusses what OTA might learn from the private sector process

¹ Some of the previous work in this area is discussed more fully in the NSF report "Technology Assessment in the Private Sector: An exploratory study," completed by the author and two of his associates at MRI. Interested parties are referred to this report of summary documents.

for technology assessment and the final section suggests how OTA in its activities should be different from the activities of the private sector.

II. REVIEW OF THE OTA PROCESS BEFORE INITIATING A TECHNOLOGY ASSESSMENT

This review of the OTA process for undertaking assessments is based upon two sources. First, there were some background readings provided by OTA in which the staff of OTA discussed their perceptions of how the assessment process worked. In addition to these materials, time was spent interviewing a few OTA staff members to determine more exactly how this process works. There were several critical questions of interest in pursuing this discussion with the OTA staff, and these are as follows:

- * How does an assessment with an OTA get started? What are the ways for it to happen? Can this process be diagramed?
- * How anticipatory can you, as staff, be to the needs of the Congress?
- * How does the study get bounded? How do you know who to contact to get the task done?
- * What else does an outsider need to be aware of with respect to your assessment process?

On the basis of these reading and discussions a schematic representing the assessment process within OTA was developed and is shown as Figure 1. This figure is fairly self explanatory but there are some points for amplification that should be noted.

In general there are three sources of requests for assessments. The Chairman of any Congressional Committee may request the same, a member of

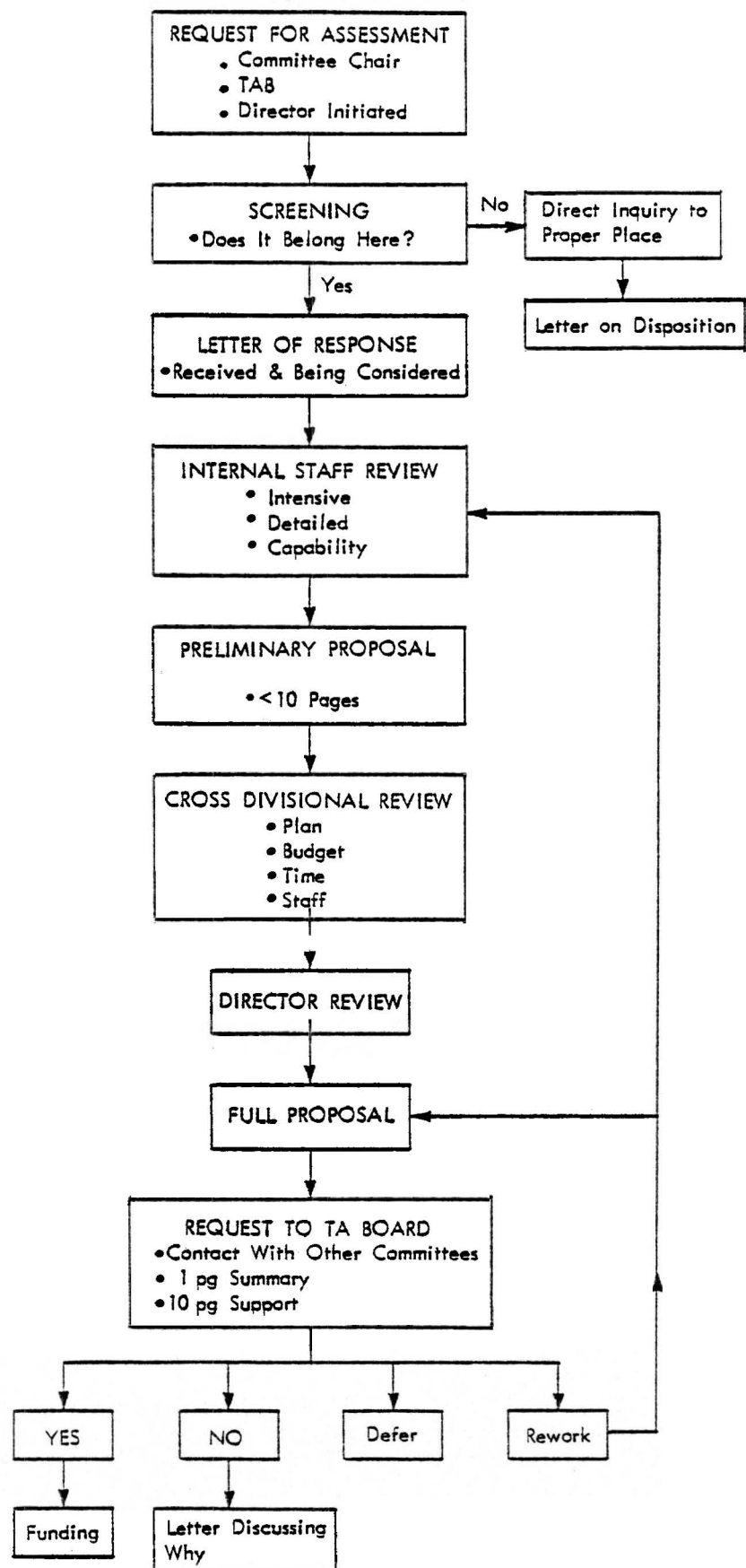


Figure 1 - OTA Assessment Process.

the Technology Assessment Board may request the same, and lastly, there are Director-initiated requests for assessments.

After some preliminary screening process there generally is a letter of response notifying the requesting agent that the inquiry has been received and is being considered. At this point there is an intensive internal staff review of the request for assessment, principally to examine OTA's capability to perform the assessment. Following this, a preliminary proposal is written and then generally reviewed across divisional lines, specifically to examine planned budget, time, and staff needs.

At this point there is a Director review and, if approved, a full proposal is prepared and sent to the Technology Assessment Board for review and approval. The Board has a number of options: to fund; to not fund, and indicate why; to defer approval and funding of the activity; or to suggest that it be reworked.

While this diagram reasonably reflects the activities within OTA it does not reflect some of the subtle interchanges that take place between the OTA staff and the staff of a Congressional Committee requesting such an assessment. It had been suggested in the interviews that the determination of which subjects will be studied how and when is an elaborate, collaborative process based on the relationships between the committee staffs and the OTA staff. Both groups are seeking windows of opportunity to provide the best information they possibly can to their respective constituents. This interplay between the committee staff and the OTA staff is very crucial to the successful completion of the assessment undertaken by OTA.

This whole process of seeking approval of assessments is focused on improving the services that OTA can effectively provide to the Congress. It is extremely important to OTA that it provide some long term views of issues which potentially will have a future impact on the Congress. OTA also needs to be very responsive to the shorter and medium term issues of

interest to Congressional Committees. OTA prides itself on its productivity and its ability to do some long range synthesizing of information which it believes relevant to congressional needs.

In all of its efforts, OTA is seeking to maintain maximum flexibility with respect to meeting congressional needs for technology assessment. This whole process generally serves the Congress extremely well. There appears to be a sufficient amount of interaction between OTA and congressional staffs to allow a very creative analysis of the critical policy issues which face the Congress in its allocation of resources for meeting public needs.

III. REVIEW OF CURRENT TECHNOLOGY ASSESSMENT ACTIVITIES IN THE PRIVATE SECTOR

One of the principal activities of this project was to reinterview some of those individuals interviewed in the first survey of technology assessment in the private sector conducted by MRI. Inquiries were sent to 33 firms. Of those inquiries, approximately four individuals contacted no longer currently work for the organization nor has their area of responsibility been assumed by anyone else within the organization. Eleven individuals had no response to our activities despite repeated telephone requests for assistance. Nine individuals declined participation and nine individuals allowed themselves to be interviewed. Five of these interviews took place within the firms where these individuals work; four were conducted over the phone.

A. Placement of the TA Process Within Planning

Generally, corporations consider themselves as doing either technology assessment as broadly defined within the governmental sense, or assessing technology in a more limited technoeconomic analysis sense. The

former process, technology assessment, is more likely to be placed within the corporate planning function in a corporation. The assessment of technology is likely to be placed within the R&D function of a corporation. Despite the differences in terminology, there is little difference in the nature of the activities undertaken by each group. The focus of the assessment of technology activity in the R&D function is perhaps more on answering the question, "does the technology work?" But there is also some consideration at this level of the potential impact of the technology within the corporation and within society as a whole. Admittedly, many of these considerations are primarily market focused.

The technology assessment function within the Corporate Planning Department is a broader base activity. Here the purpose of the assessment process is to prepare a business development scenario or plan. Such a plan would suggest how the technology is likely to fit or not fit the existing economic infrastructure normally served by the technology under consideration. Because it is part of the planning process such an assessment activity is often limited to new ventures or the diversification/acquisition interests of the firm. It should be obvious then from these comments that technology assessment in a private sector is best considered to be a full strategic analysis of the business opportunity of interest to the firm.

B. Cases of Private Sector Structuring of a TA Function

Illustrations of how two firms structure their technology assessment function will be presented here. While the firms themselves will be named, the issues, problems, or projects upon which they are working will not be discussed. The purpose here is simply to indicate how the TA function fits within the organizational structure of the firm.

1. The Sun Company: The first case will be the Sun Corporation of Radnor, Pennsylvania. Sun is novel in that it has a specific individual responsible for the technology assessment function within the firm.

There are six staff senior vice presidents within Sun who have corporate responsibilities. The two senior vice presidents of interest here would be the senior vice president for planning and the senior vice president for technology. The senior vice president for planning has two vice presidents reporting to him, one of whose function most specifically is corporate planning. The other vice president reporting to the senior vice president for planning has responsibilities for examining and indicating the anticipated future business environment facing the corporation. These individuals feed information to the staff who report to the senior vice president for technology and it is to this senior vice president position that the technology assessment function reports. There is a vice president of business development within the technology staff function and it is the responsibility of this individual to write the business development plan for those technologies which may require investment funding from the Sun Corporation. The individual responsible for the technology assessment function coordinates his activities with the vice president of business development. Both of these individuals rely on information coming from corporate planning.

This appears to be an optimally structured relationship which puts the responsibility for examining technology and its impact on the organization in a function different than overall planning for the corporation. The real benefit of such a structure is that it forces substantial interchange between the technology function and the planning function of the major firm. It is this interplay or interchange that produces sound business decisions on technical development.

2. The Eaton Corporation: The second case is that of the Eaton Corporation in Cleveland, Ohio. Here the technology assessment function is the principal responsibility of the corporate planning group within Eaton. Eaton has the assessment of technology activity placed within the research development and engineering arm of the firm. It looks to the corporate planning department to provide the appropriate business development scenarios which then serve as basis for the technology assessment of those technologies being considered for development. Where explicit technology assessments are needed, ad hoc groups representing diverse functions within the

opportunities for growth and development and facing substantial inflationary pressures to do so, these firms need to be even more discerning in how they allocate their internal resources to future corporate development. Many of them believe it is through the strategic planning process that they will be able to more effectively employ the asset base at their disposal in maintaining the previous levels of growth and development.

Another part of the reinterviewing process was the asking of a number of other questions that specifically focused on current issues faced by these firms -- issues which might force more TA to be done. It was of interest to determine the time frames considered in the assessment process; the impact of government regulation; the shifts in the economy in general; the world political situation; and technological change itself were having on the firms. Did these issues force more TA to be done?

The time frames for analysis varied considerably. But firms were principally focused on that span of time between the present and the year 2000. In terms of government regulation most firms expected more regulation to be taking place but felt that they had become adjusted or accommodated to such regulation and believe it to be more manageable by them now than it has been in the past.

Most firms felt that the general economy was not an inhibitor to their growth and development. The economic trends and inflationary drives have made them more thoughtfully selective in their choice of pursuits but they felt that such pressures had in fact forced them to improve their ability to prudently select the ventures in which they wish to engage.

The world political situation has caused an interesting change in corporate focus. More corporations are moving to geographic regions where their products or services are used. This in fact was the single largest difference that we found in discussing technology assessment and planning with these firms. While the world political situation has been of some concern to them in the past, all the firms felt that they were in a much better position to understand the political shifts within the world business environment.

IV. A COMPARISON OF PRIVATE AND OTA TECHNOLOGY ASSESSMENT

A. Introduction

While this comparison might best be done by the OTA staff on the basis of information contained within the earlier report and this paper, the author was asked to provide an outsider's view of how the assessment processes within each group are similar and are different. It should be noted here that the structure which has evolved for the assessment process within OTA is similar or closer to the assessment process within the private sector than is the TA process used by agencies within the executive branch of the government. It is interesting to consider how this came to be, and will be discussed very briefly here. It is based on at least one perception of the difference between an executive agency and a congressional office.

The Congress is structured somewhat like a modern organization. Congressional committees in and of themselves could be considered groups where particular services or products are marketed to the public as a whole. The Office of Technology Assessment literally has a Board of Directors, a situation which is analogous to a private firm. The staff of OTA is responsible to that board for its activities and its analyses. Again, the situation is very similar to that which exists in the private sector. OTA is called upon to do a wide range of studies over extremely variable time frames. This situation reflects exactly what happens to the TA function within private sector firms.

On the basis of discussions with OTA staff as well as staff within the private sector, it should be noted that there is a substantial amount of internal discussion and debate on what should be done, how it should be done, when it should be done, and how much should be spent to accomplish the particular objectives of the analysis. Consequently, many of the pressures which face people serving in the technology assessment function within the private sector are the same as those pressures faced by the OTA staff in completing their assessments.

It was very interesting to then use this perspective in trying to compare private sector and OTA technology assessment activities. Such a comparison is shown in Table 1. The principal differences between the private sector and OTA assessment processes have to do with potential outcomes. Private sector assessments are directed toward generating the policy options available to meet desirable ends. Implicit in these policy options may be a recommendation, but as the report is going to another group, namely Congressional Committee, the committee in and of itself will reserve the right to change, delay, or add options to such a report. .

The second principle difference is really implicit in the differences between private and public entities. OTA and the Congress have the responsibility of balancing the multiple public needs and goods which exist with the resources that can be allocated to meet these needs while maximizing the social benefits for the citizenry. This rather broad mandate implicit in democratic government is a source of immense conflict. While there may be conflict within a firm in the private sector, the whole process of doing an assessment is directed toward eliminating the conflicts. The OTA function is explicitly to maximize information and analysis on the potential conflicts which exist in public policy terms.

In summary, it is being suggested that there are more similarities than differences between these entities. Yet the differences are extremely critical to the maintenance of the democratic, market-based political economic system we have in the United States.

TABLE 1

COMPARISON OF PRIVATE AND OTA TECHNOLOGY ASSESSMENT

<u>Industrial</u>	<u>OTA</u>
<u>Objectives</u>	
. Profit maximization	. Best analysis at minimum cost
. Conflict identification and positioning	. Conflict identification
. Market diversification based on perceived consumer need	. Maximize social benefits
. Identification of consumer need	. Balancing public needs/goods
. Corporate direction-setting/decisionmaking	. Formulate public policy options
<u>Structure</u>	
. Flexible process	. Structured, yet flexible process
. Ad hoc, mission-oriented task force	. Formally organized, mission-oriented study group, panels, contractors
. Mostly internal effort, some use of external resources	. Mostly external analysis, internal staff focuses on policy issues
. Private oral report	. Public written, published reports
<u>Time Frames</u>	
. Short to mid-term view	. Short, mid, long-term views
. Study takes 1 year to complete	. Study takes 6, 12, 18, 24 months to complete
<u>Other Perceptions</u>	
. Complete thinking on business development	. Complete thinking on options to achieve social good
. Accountable to stockholders	. Accountable to Congress
. Survival of firm	. Impact on decisionmaking/awareness
. Competitive environment	. Resource allocation among equal "goods"

V. WHAT OTA MIGHT LEARN FROM THE PRIVATE SECTOR

There are a number of areas where OTA might learn something from the private sector experience in doing technology assessment. The first area is the degree of flexibility. OTA has worked diligently to keep flexibility as part of its procedure for doing technology assessments, but there are still other things which could be done. Some of the structured parts of the process (e.g., Delphi, simulations) are not necessary to the process nor do they necessarily provide good information for decision-making. Generally, though, OTA has learned to rely on its past experiences particularly with respect to the use of techniques for assessment so as to maintain the flexibility necessary to complete the study in as timely a manner as possible.

OTA might learn something from the use of what will be called the market or consumer thinking with respect to its potential outputs. Undertaking business development analyses is perhaps one of the most creative aspects of work within the private sector and virtually all of these analyses are consumer-based or market-based in thinking. There generally is no loss of creativity with respect to generating options for activity where the market mechanism is used as a basis for analysis.

It is also imperative that the analyses undertaken by OTA try to focus on use of the market mechanism where possible in the generation of policy options for implementation. Traditionally, government has created its own market mechanisms. Consideration of how government might provide incentives to allow private markets to accomplish many of the socially desirable goods that are sought by government is very much needed.

The third area of learning perhaps is best called incremental reversibility of decisions. In general, government moves incrementally in its decisionmaking. Such incrementalism is well founded particularly where some reversibility of the decision is desired. It is realized that OTA will face a great number of situations in which such an incremental reversible approach is neither appropriate nor feasible. But again these considerations

of incrementalism and reversibility are important to the provision of good analysis.

OTA already has a series of on-going assessment activities, that is, longer term views of future change. This capability should be strengthened and made more relevant to OTA and to the Congress. Again, this particular capability is very analogous to the strategic planning function of these firms. OTA has a significant role to play in providing strategic thinking and guidance to Congressional Committees.

This issue of strategy, however, does represent a very large problem at OTA. The strategy requires that a series of mutually acceptable goals are set along with some general direction on how to attain those goals. The goals for a country or a particular program are not so easily set nor do all constituents necessarily agree with what those goals are. OTA might be able to contribute to the deliberative process within the Congress by providing some goals and the strategic framework in which some of those goals may be met as part of its long term ongoing analysis of the critical issues facing the Congress.

VI. HOW OTA MUST BE DIFFERENT THAN PRIVATE SECTOR TECHNOLOGY ASSESSMENT EFFORTS

When thinking about this issue, the first question asked really is should OTA be different from the private sector? If so, why is it to be different in its assessment process? Some of the differences have already been explored. The focus of discussion here is on why it should be different.

Many of the issues that are a part of OTA's analysis surround either social benefit, social welfare maximization, or provision for public goods and these issues are forged in a furnace of conflict within the halls of the Congress. As noted earlier, this conflict issue is at the heart of the democratic governmental process. Corporations do not exist to create con-

flict; they work very hard at ameliorating conflict. So, OTA must continue to be aware it is to be in the center of the conflict on congressional decisions regarding technical development.

The second way that OTA can remain different is to work very hard at options generation. The whole focus of private sector technology assessment is to recommend an outcome of setting of corporate direction--one direction or activity. OTA is not allowed the comfort of such a position. OTA's staff are well aware of the creativity necessary to provide the viable options which will produce good information relevant to good decision-making on providing for social needs.

The issues analysis within OTA is critical. There is no real "asset base" for change within OTA. It has to be right the first time in its analysis. Corporations may choose to invest its assets in a particular project and after a certain amount of time withdraw from that project if it is not meeting the needs or expectations of the firm. There is a possibility then for reversibility for the private sector because of that. Commitments made on the basis of OTA's recommendations are not so easily reversed. It is vitally imperative then that OTA be right and be right the first time.

In conclusion, there is much to learn by OTA from the private sector experience in technology assessment. Most of those perceptions have been discussed here but another recommendation should be made--members of the OTA staff should spend time visiting with those individuals in the private sector who are responsible for technology assessment activities within the private sector to make some sense of how to better employ methods, techniques, time, talent and dollars to provide the excellent analysis needed for the reports it generates for the use by the Congress. A very small investment of time and manpower is likely to earn a substantial return on improving how OTA can meet the needs of the Congress.

APPENDIX A

COVER LETTER AND QUESTIONNAIRE



December 5, 1980

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7, 8 9//

Dear //2 4//:

Midwest Research Institute, under the sponsorship of the Congressional Office of Technology Assessment (OTA), is following up a previous MRI study of planning and forecasting in industry to determine how and to what extent companies forecast and evaluate new product/service opportunities. Beyond the traditional economic/financial concerns, we are interested in learning how companies deal with other elements--such as potential environmental impacts, regulatory considerations, and the social context into which the product or service will be introduced.

The evaluation of all these areas has been called "technology assessment," that is, the ability to anticipate the consequences, impacts, and outcomes of decisions and alternative business strategies. We believe the results of our study will help all companies understand and improve their capabilities in this area, and we believe your participation in this effort might also prove to be a valuable learning experience for you.

Your firm is one of 30 randomly selected from the previous firms we surveyed for participation in this study. As was the previous case, I want to assure you that individual company specific information obtained from the enclosed survey questionnaire will be held strictly confidential. And you, as a cooperating firm, will obtain the results of the study.

I or one of my associates will contact you within the week to discuss your participation in the survey and answer any questions you may have. We look forward to discussing this project with you.

Sincerely,

James D. Maloney, Jr.
Manager
Management Services

JDM/sp

Enclosure

PART I - INTRODUCTION

1. Are you familiar with the term "technology assessment" (TA) and how it is used? ☐ Yes ☐ No Please explain what TA means to you.
(if no, go to 4)

2. Does this planning concept fit your organization? Does it apply to your activities within the firm? Do you undertake analyses which fit the description of technology assessment? How do you perform technology assessment? (Steps) Example?

3. Should your organization be doing technology assessment?

4. How do you analyze your venture * opportunities? What functional groups within the firm are involved?

5. What is your process for venture analysis? (Step by step)

* Define - if not TA-like, go to #25

6. What are the factors you are now considering in your business forecasting/venture analysis work?

7. How much of a long-range planning view do you take for your examination of new business opportunities? (No. of years outlook, special considerations)

8. Has governmental regulations required you to use a larger range view in your business planning? If so, what tools are you using to complete these analyses?

9. Has the general economy required you to use a larger range view in your business planning? If so, what tools are you using to complete these analyses?

10. Has the world political situation required you to use a larger range view in your business planning? If so, what tools are you using to complete these analyses?

11. Has technological change required you to use a larger range view in your business planning? If so, what tools are you using to complete these analyses?

PART II - ASSESSMENT PROJECTS IN CORPORATE DECISIONMAKING

A. General

12. Does your company perform any of the following types of assessment projects? (check off)

____(a) Technology forecasting ____ (b) Environmental impact assessment ____ (c) Socioeconomic impact assessment ____ (d) Social values forecasting ____ (e) Regulatory monitoring ____ (f) Economic forecasting

13. In performing these assessment projects, which of the following impact areas do you consider? Please use the following code to indicate how you consider each area.

1. Formally (using systematic procedures to collect and analyze data)
2. Informally
3. Not at all

Impact Areas	New Technology/ Business Venture	Rank in importance 1 - most important to 7 - least important
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Economic/Financial
Technological
Environmental
Social
Political/Legislative
Legal
Competitive

14. Generally speaking, what is the relative importance of the following motivating factors in prompting assessment projects? Please rate each of the factors from 1 (very important) to 5 (not important at all).

____ Government Regulations
____ Social Consciousness
____ Corporate Policy
____ Environmental Consciousness
____ Good Business Practice
____ Competition
____ Other (please specify)

B. Methodology

15. What are your greatest sources of information in performing these assessment projects? Please rank in terms of relative importance. (1 to 6)

In-house expertise _____
Outside consultants _____
Trade association(s) _____
Academic community _____
Government sources _____
Other (please specify) _____

16. What specific techniques or research strategies have you found especially useful in conducting your assessment projects? Please describe them briefly.

17. If your corporation monitors changes in social values and goals, how do you it?

18. How does your company integrate these assessments into your decision-making process?

_____ Convert all impacts--however imprecisely--to financial terms.
_____ Subjectively evaluate nonfinancial impacts.
_____ Develop new index of measure which incorporates financial and nonfinancial impact areas.
_____ Assign priorities to a range of impacts.
_____ Show alternative options and tradeoffs for each impact.
_____ Other (please specify).

19. What are the most common obstacles encountered in using the results of your assessment projects? _____

20. What impacts have assessment projects had within your company? Check all appropriate responses.

_____ Project approved
_____ Project not approved
_____ Modification of original project plans
_____ Alerted company to potential problems
_____ Identified new market opportunities
_____ Other (Please specify) _____

C. The Past and The Future

21. How, when, and by whom were assessment projects initiated in your company?

22. Has your approach to corporate planning changed over the past 3 years?
Yes _____ No _____

If yes, in what way? _____

23. Do you foresee changes in the conduct of future assessment projects?
Yes _____ No _____

If yes, in what way? If no, why not? _____

24. Other than profit, what are your corporation's major concerns for the immediate and long-term future? _____

25. If you have not conducted assessments which address impacts other than economic/financial and technological:

- a. What is the relative importance of each of the following factors in influencing your position? Please rate each from 1 (very important) to 5 (not important at all).

_____ No need
_____ Little utility in results
_____ Not worth the investment
_____ Costs too much

_____ Necessary information not available
_____ Necessary techniques not available
_____ Insufficient time to conduct study
_____ Insufficient staff to conduct study
_____ Other (please describe)

- b. Do you anticipate conducting assessment projects in the future which address impacts other than economic/financial and technological?

Yes _____ No _____

Why or why not? _____

Example Assessment

New Technology/Business

1. Title: _____
2. What prompted the study? _____
3. Brief description of factors considered: _____

4. Types of techniques used: _____

5. Where in the organization was the assessment:

Initiated? _____
Conducted? _____
Reviewed? _____
6. What impact, if any, did the assessment have on the decisionmaking process?

7. In retrospect, was the study complete and accurate? What were the weaknesses?

8. If possible, please estimate:

The cost: _____
The level of effort (person-days): _____
9. Was money lost or saved as a result of the assessment? _____
Were there any intangible benefits, gains or losses as a result of the assessment? _____

Definitions Used For
Questionnaire Terms

Question

12. a) Technology forecasting - the prediction of the invention, innovation and diffusion of tools and techniques.
- b) Environmental impact assessment - the determination of the effects of the product or technology on the physical and biological environment, including air, water and noise pollution; resource depletion; disturbances in the ecosystem; introduction of carcinogens or other pathogens.
- c) Socioeconomic impact assessment - the determination of the effects of the product or technology on employment, income distribution, demographic characteristics (age or race distribution), land use, etc.
- d) Social values forecasting - projection of changes in goals, preferences, and mores (e.g., whether individual ownership of automobiles will still be valued in 1990).
- e) Regulatory monitoring - maintaining an up-to-date awareness of governmental policies, pending legislation which could affect your products.
- f) Economic forecasting - projecting trends in the American economy, such as GNP, capital investments, employment.
- g) Strategic planning - corporate planning which goes beyond those activities necessary to maintain operations; also can be termed long-range planning.

13.

Economic/Financial - impacts on productivity, employment, prices; indirect costs associated with pollution, new plant construction; effects on balance of trade in international market.

Technological - examination of alternative technologies, as well as technologies needed to support that under consideration; impacts of competitive technologies on resource availability, etc.

Environmental - impacts on the physical and biological environment, including air, water, noise pollution; resource depletion; disturbances in the ecosystem; introduction of pathogenic materials.

Social (society as individuals) - impacts resulting from displacement or obsolescence of workers; deterioration of property values; occupational health and safety; demographic shifts (age, race, etc.); impacts on social values and mores (e.g., by the pill, the automobile).

Political/Legislative - impacts on governmental activity: need for regulations, monitoring of new products/technology; need for tax incentives, governmental support for additional research.

Legal - secondary impacts on the legal system; creation of such legal issues as sun rights by solar energy development.

Competitive - interrelationship of new product/technology with similar products/technologies; impact of substitute technology on competing industry; e.g., substitution of injection-molded auto parts for steel.

APPENDIX B

INDIVIDUALS CONTACTED

Mr. Jack Field Director Corporate Strategic Planning Department Union Carbide 270 Park Avenue New York, New York 10017		Interviewed
Mr. Bruno Maiolo Manager, Business Analysis Grumman Aerospace Corporation C34-05 Bethpage, New York 11714		Interviewed
Mr. Robert L. Martin Corporate Planning Eaton Corporation 100 Eireview Plaza Cleveland, Ohio 44114		Interviewed
Mr. Robert Loughridge Director Economic and Strategic Planning The Goodyear Tire and Rubber Company 1144 East Market Street Akron, Ohio 44316	Lowell Bird	Interviewed
Mr. Bill Sauber Corporate Product Department Dow Chemical Company 2030 Dow Center Midland, Michigan 48640	Mr. John Schwendimass Manager, Int. Bus. Environ. (517) 636-4569	No response
Mr. Howard C. Jensen Corporate Planning Control Data Corporation P.O. Box 0 Minneapolis, Minnesota 55440		Declined participation
Mr. Chris Kristoff Corporate Planning General Motors Corporation GM Building Detroit, Michigan 48202		Interviewed

Mr. W. G. Cole, Jr. Vice President - Corporate Planning Ferro Corporation One Eireview Plaza Cleveland, Ohio 44114	John Seaton/Jerry Heideman	No response
Mr. Harry Goern General Manager Corporate Planning Alcoa Aluminum Company 425 6th Avenue Pittsburgh, Pennsylvania	Ken Calhoun Returned (not received)	No response
Mr. Roy R. Anderson Vice President Allstate Insurance Company Allstate Plaza, F-7 Northbrook, Illinois 60062		Declined participation
Mr. John E. Yingling, Jr. Director - Corporate Planning 295 North Maple Avenue Basking Ridge, New Jersey 07920		No longer there
Mr. Xavier Loinaz Citibank 399 Park Avenue - 16th Floor New York, New York 10022		No longer there
Mr. George Prendergast, Jr. Corporate Planning Division E. I. du Pont de Nemours and Company 1007 Market Street Wilmington, Delaware 19898		Done by V. Coates (?)
Mr. Asaph H. Hall Staff Vice President - Corporate Planning General Dynamics 7733 Forsyth Boulevard St. Louis, Missouri 63105 (314) 862-2440		No response
Ms. Susan Conway Director of Planning Corporate Strategy Group INA Corporation 1600 Arch Street Philadelphia, Pennsylvania 19103		Declined participation

Mr. Ralph Neubert Director Strategic Planning Monsanto Company 800 North Lindbergh Boulevard St. Louis, Missouri 63166	(314) 694-3048	No response;
Mr. James R. Olson Vice President, Strategic Planning The Pillsbury Company 608 Second Avenue, South Minneapolis, Minnesota 55402	Dr. John Holland will be returned	No response
Mr. W. J. Adams, Jr. Manager New Business Development FMC Corporation 1185 Coleman Avenue Box 580 Santa Clara, California 95052		No response
Dr. Lowell W. Steele Manager, R&D Planning General Electric R&D Center P.O. Box 8 Schenectady, New York 12301		No response; resent 12/4
Dr. Dwain L. Jeter Vice President - Development International Multifoods 1200 Multifoods Building Minneapolis, Minnesota 55402		Declined participation
Mr. Nate Higginbotham Director, Business Environment Analysis and Forecasts McDonnell Douglas Corporation P.O. Box 516 St. Louis, Missouri 63166 (314) 232-7749		No response
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