1. **Please describe the type of market research you do for GM and how your background and experience as a social scientist influences your work.**

I have been employed at GM since 1978. My marketing research work includes:

(1) **Estimating the change in product demand given changes in product prices.** *This work draws heavily on conventional economics.*

(2) **Grouping products into segments (e.g., small, mid-sized, etc.) based on which products customers consider comparable.** (This addresses questions like: `do people first decide they want a vehicle made by a certain manufacturer and then shop among the available vehicles made by the manufacturer or do they first decide they want a mid-sized vehicle and then look across manufacturers in determining which mid-sized products they will consider. *It is based on psychological work on how individuals decide which items are similar.*

(3) **Grouping customers into segments** (e.g., lower income people with large families, people who want some style but are price-sensitive, people who are want a vehicle that conveys status, etc.*) This draws mainly on the socioeconomic literature about the different social classes in America, their needs for a vehicle (if they have large families or need towing capacity) as well as whether they view the vehicle as merely a means of transportation, an expression of personality or status, or something they want to enjoy.,*

(4) **Modeling demand for products** as a function of all the major attributes of the product: performance, comfort, appearance, price, etc. *This draws mainly on the economic and statistical literature.*

(5) **Modeling the decision process by which customers**

(5.1) Become aware of a product: (How much can advertising affect awareness?) *This works draws heavily on psychology.*

(5.2) Come to seriously consider the product: (Given the hundreds of products available, what are the simple criteria people use for winnowing the set of choices down to a manageable set of choices? Do they screen out vehicles with a poor image for quality, a poor image for environmental-friendliness, etc?) *This draws on the psychological and sociological literature on how products acquire an image and reputation.*

(5.3) Come to shop for a product (Do people visit a lot of dealers or a few? How much does the increased availability of information on the internet affect the shopping process?) *This is an economic/psychological question.*

(5.4) Come to buy the product. (What kinds of products should a dealer have on their lot to maximize the chances of having what the customer needs? What kinds of financial offers are more attractive in sealing the deal? How should dealers determine how best to approach each customer since some customers are very detail-oriented, others are more holistically oriented?) *Some of these questions draw on economics, others draw on areas of psychology that are still being researched.*

(6) **Modeling the impact of advisor recommendations** on the products customers seriously consider. (Recommendations come from the internet, consumers report and other magazines, automotive magazines, word of mouth, etc.) *This is still an area of considerable research by psychologists and marketing researchers. What sources of information do people trust?*

(7) **Understanding the differences between work practices in different dealerships** and how those different work practices lead to better or worse dealer performance. In this kind of problem, the dealership is often treated as a special `culture' which is studied using adaptations of methods in *cultural anthropology*.

2. What has social science research revealed about factors that influence an individual's vehicle purchasing decisions? What questions remain unanswered? Have you looked specifically at the issue of fuel economy?

    (1) Developments in economic and psychological methodology on models predicting individual choices and how those models can be best estimated have been central to modeling customer demand. The economist, McFadden, was awarded a Nobel Prize because of his central role in creating many of these models. The mathematical psychologist, Duncan Luce, received the National Medal of Science for his role in creating the building block that led to McFadden's work. These models help GM understand, for example, the relative importance of quality, performance, roominess, fuel economy, and price in affecting a customer's chance of buying a vehicle. We also employ direct assessment techniques for trying to assess customer willingness to pay for these attributes (as well as for specific features like Onstar.) Conducting these clinics is based on methodologies developed in psychology. The company also conducts massive surveys and, once again, psychological theories about how questions should be asked in surveys have been very important.

    (2) The whole question of how the Internet has reshaped the purchasing process is a very active area of current research --- to which noone has yet developed a definitive answer. Does the internet shape customer preferences to focus on attributes that are more communicable on the internet (e.g., cost and quality ratings) versus less communicable attributes (like vehicle styling and the interior comfort of its seats)?

    (3) I myself have not specifically looked at the issue of fuel economy.

3. How are recent breakthroughs in research incorporated into marketing or business strategies? What role might the National Science Foundation play in building bridges between academic social science researchers and government and industry policy makers?

    (1) The previous models assume that individuals are rational. Research in both economics and psychology (e.g., the Nobel-Prize winning work of economist, Vernon Smith, and psychologist, Daniel Kahneman as well as Herb Simon) has strongly undermined that perspective. This suggests that the entire

paradigm may potentially have to be rethought on the basis of a psychologically sounder understanding of human behavior.

(2) There are clearly some success stories in industry/university collaboration as well as many more stories of non-success. The fact that a paper gets published in a journal which cites industry support and funding for the project definitely provides no guarantee that the research was ever used (or even looked at) by the sponsoring company. However the Edelman competition of the Institute of Operations Research and Management Sciences provides many examples of clearcut successes where universities were often involved. We need to learn from these and other success stories.

It would be wrong to say that NSF has not already built some bridges between university and industry. The Decision Risk and Management Sciences Program of the National Science Foundation, when I was a program director there, had a program that was explicitly concerned with funding research with matching support from industry. NSF also has small business initiation grants that are explicitly focused on trying to encouraging technology. I administered some of those grant proposals and felt that this program was also very useful. (This is probably also true for other NSF programs with which I am not directly familiar.) We need to look at these existing programs, understand both what is successful about them and what is less successful about them, so that we can strengthen the bridges which NSF has already tried to build.

(3) Here is another thought: We might imagine moving to a model where a person with an endowed chair by a certain company would be committed to physically spending a certain number of days a week on-site in that company's location or on-site at the location of a consortium where industry practitioners would have direct access. Currently endowed chairs are mainly housed in universities where their occupants are more removed from the specific needs to industry. While it's important to have some time spent in isolation from the practical problem --- in order to think about it --- it's also important to have some time spent directly involved in the practical problem. A practical problem is frequently not something that can be communicated from an industry person to an academic with a short e-mail. And even when it is successfully communicated by e-mail, the academic solution to that problem often turns out to be too late and too complicated to address the real practical issue. The Center for Naval Analysis used to have a program (and might still have a program) where researchers were rotated between the research labs to work onboard a ship in order that they retain a real feel for the needs of industry.

So a lot has been done to build bridges and NSF deserves high praise for its accomplishments. But there is more that could be done.

Bob Bordley