AWARE ||||||||

A Step Toward Building a Sustainable Economy by Informing Consumer Purchasing Decisions at the Point of Sale

US Environmental Protection Agency Executive Summary

P^3: People, Prosperity, and the Planet Project Grant #SU831868

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Executive Summary

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EPA AGREEMENT NUMBER: SU831848

PROJECT PERIOD: Sept. 30, 2004 – May 30, 2005

PROJECT TITLE: AWARE: Facilitating Informed Consumer Purchasing Decisions through Point-of-Sale Access to Product Sustainability Information (*original title of proposal*)

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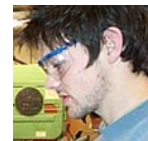University of Michigan

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DESCRIPTION AND OBJECTIVE OF RESEARCH:

American consumers make purchasing decisions about huge numbers of products every year. These decisions are based primarily on easily-observable factors such as product form, features, price, packaging, and brand. The lack of simple, reliable, convenient, and accessible information about the social and environmental impact of products and their producers results in such concerns being ignored by consumers and thus undervalued in the marketplace. Corporations, working to stay competitive, and following economic incentives, often compromise social and environmental responsibility in pursuit of reduced cost and increased market share.

The concept of AWARE is to provide consumers with quick and simple access to customizable information about the social and environmental characteristics of products and their producers on demand and at the point of purchase. We believe that informing consumer decisions will impact purchasing habits. Sufficient changes in purchasing patterns would create market forces providing economic incentives for companies to put more emphasis on social and environmental performance.

Toward this end, seven student groups were formed over the past eight months to develop projects that address different aspects of AWARE including concept development, design, prototyping, and assessment of impact. A summary of each of these projects is provided below. The projects labeled "Spring 2005" are course projects with final deadlines later than the date of this report, and they are still in progress. This report serves to summarize the seven projects and put them into context with the larger goal of AWARE. Detailed reports on the individual projects can be found at http://www-personal.engin.umich.edu/~michalek/AWARE.

1. Mechanical Engineering 490: Independent Study 01 (Spring 2005)

People: Katie Kerfoot, Jeremy Michalek (facilitator), Professor Steven Skerlos (instructor)

Eco-Indicator 95

Refrigerator Model
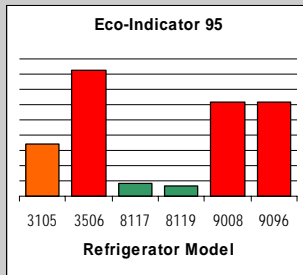
|	Production	Consumer use	End of life (Sv)	Total
Non-renewable resources				
Material resources (kg)	188	15	0.005	203
Energy resources (kWh)	930	4080	0.11	5010
Renewable resources				
Material resources (kg)	1	192	0.07	193
Energy resources (kWh)	13	3240	-	3250
Energy consumption (kWh)	943	7320	0.11	8260
Emissions				
Greenhouse gases (kg CO₂-eq)	185	205	62	452
Ozone-depleting gases (kg CFC-eq)	0	0	0	0
Acidifying gases (mol H⁺-eq)	52.3	9.3	2.6	64.2
Ground level ozone gases (kg POCP-eq)	0.08	0.05	0.14	0.27
Eutrophication compounds (kg O-eq)	4.4	2	0.7	7.1
Recyclable resources				
Materials (kg)	3.3*	-	47.3	50.6
Energy (kWh)	-	-	184	184
Waste (kg)				
Hazardous waste	0.09	0.16	0.16	0.41
General waste	284	262	7	553

Project: Research, analyze, and develop product-specific environmental information systems for AWARE. Identify potential issues, make recommendations, and compile data for sample products to use in the PDA prototype created by Garlin Gilchrist (ME490 project). Also, assess the availability of producer-level information from watchdog groups.

Results: Product-specific data compiled for refrigerators, detergents, and printer cartridges based on available information. Aggregation metrics calculated based on Eco-Indicator 95, 99, and EDIP methods. Multiple layers of information provided.

Conclusions: While it is not possible to objectively aggregate environmental impact into a single rating, several aggregation schemes do exists, and allowing consumers to choose among them while giving access to layers of information can provide useful product-level data. While publicly available product-level data is currently scarce in the US, such data does exist in Europe, and applications such as AWARE that make use of product-level data could act to drive data collection in the future.

2. Mechanical Engineering 490: Independent Study 02 (Spring 2005)

People: Garlin Gilchrist II, Jeremy Michalek (facilitator), W. Ross Morrow (graphic design), Professor Steven Skerlos (instructor)
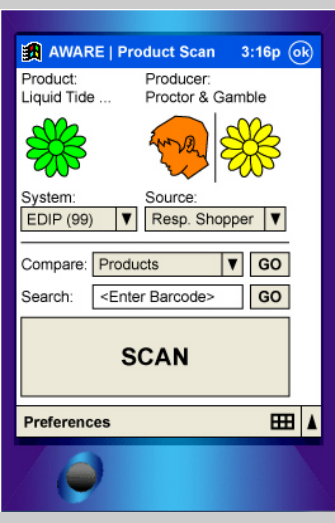
Project: Develop a functional PDA barcode scanner prototype that will provide (1) producer-level data about the scanned product from Co-op America's Responsible Shopper database and (2) product-level data for the products compiled by Katie Kerfoot (ME490 project).

Results: A PocketPC prototype was successfully developed for a database of products and companies using an existing scanner accessory. The software can also be used without the barcode scanner to look up information manually.

Conclusions: The prototype demonstrates the AWARE concept and can be used to assess usability and identify areas for improvement to make AWARE more attractive and more likely to be used. The prototype can also be used to measure the extent to which access to information affects consumer behavior and creates sufficient market conditions for change.

3. Mechanical Engineering 450: Design and Manufacturing III (Spring 2005)

People: Dan Bartz, Halil Hamut, Dannielle Sita, Tyson Smith, Jeremy Michalek (client), Professor Steven Skerlos (instructor)


Project: Develop a functional prototype for a small, portable, inexpensive, "keychain" version of AWARE, and explore other potential design alternatives.

Results: Oversized functional prototype of keychain concept developed with separate housing to show scale of the final product. Cart-mounting developed for the PDA concept. Preliminary prototype of cellular phone scanner concept developed.

Conclusions: Cellular phone concept allows greater flexibility to make AWARE attractive to average consumers. Key chain concept could be an attractive way to reduce cost, although it can provide only aggregated information.

4. Marketing 618: Survey Design and Analysis (Fall 2004)

People: Scott Jamison, Pierre Baudot, Mitsuaki Sato, Abhishek Roy, Gabriel Zhou, Jeremy Michalek (client), Professor Fred Feinberg (instructor)
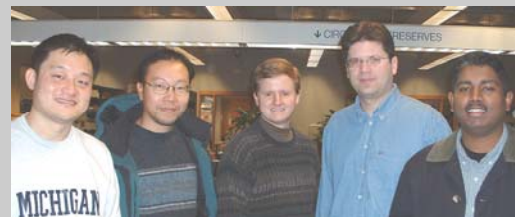
Median premium for company color-code rating:

	Detergent	Cleaner
Red	*Baseline*	*Baseline*
Yellow	0%	16.7%
Grey	16.5%	24.7%
Green	16.7%	33.3%

Project: Design and implement a survey to determine the extent to which access to information about the social and environmental performance of products and their producers would affect consumer behavior.

Method: To reduce survey bias, different survey respondents were shown products with different characteristics and asked to price each product. Median responses were compared across respondents.

Results: Price premiums (i.e.: the additional amount customers will pay) for products with social and environmental performance ratings were estimated from 1100 respondents for a handful of products. Customers were consistently willing to pay significant premiums to buy products with environmental characteristics and to buy from companies rated as being more responsible. Selected data is shown here using color-coded company ratings from the watchdog group Co-op America.

Conclusions: The survey provided strong evidence that consumers state an expectation to pay premiums for green products from responsible companies if the information is there. Further studies are needed to determine the extent to which this survey data matches market behavior.

5. Mechanical Engineering 589: Eco-Design and Manufacturing (Fall 2004)

People: Arnaud Bizard, Brett Lee, Karen Putterman, Professor Steven Skerlos (instructor)

Project: Study environmental labeling programs and report on appropriateness for AWARE

Results: Reviewed existing labeling systems and mapped out preliminary AWARE interface sketches

Conclusions: More transparency is needed in the marketplace in order to provide objective and effective product-level information via AWARE.

6. Art and Design 441: Studio Project (Spring 2005)

People: Dena Bai, Kirsten Climer, Elizabeth Fagan, Evan Fulford, Sabina Rahaman, Brian Rhee, Ryan Wainwright, Jeremy Michalek (client), Professor Jan-Henrik Anderson (instructor)


Project: Explore innovative conceptual design possibilities for AWARE and build aesthetic prototypes of the best ideas.

Results: Several concepts were explored for variations on style, interface, and dual-use functionality.

Conclusions: Different target markets could be reached with different design concepts, for example, a 'badge of honor' theme to help the owner communicate pride about her/his commitment to social responsibility.

7. Engineering 490: Engineering for Community (Spring 2005)

People: Michael Miller, Juan Novella, Annisha Russell, Coriel Greene, Miguel Verdejo (facilitator), Shauna Puhl (facilitator), Jeremy Michalek (client), Professor William Schultz (instructor)
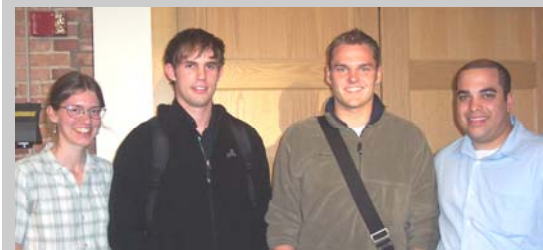
Project: Study the current AWARE direction and assess impact from a community perspective. Provide recommendations and develop a semester project of appropriate scope, for example, developing a prototype or doing research on the information that AWARE may provide.

Results: Developed a website to compile efforts on the AWARE project and created a wristband campaign concept for publicity. http://www-personal.umich.edu/~juampisn/aware%20main.htm

SUMMARY OF FINDINGS:

Student groups 2, 3, and 6 showed several different forms that the AWARE information device could take, including PDA, cellular phone, keychain, and wearable devices. The functionality of the PDA, phone, and keychain designs were demonstrated with working prototypes. Group 5 researched existing labeling systems, developing a sketch AWARE interface, and group 1 researched product-specific environmental data on refrigerators, detergents, and printer cartridges for use in the PDA prototype including aggregation metrics such as Eco-Indicator and EDIP, selectable by the user. Producer-specific information is attained through watchdog groups, with sources such as Co-op America's Responsible Shopper database selectable by the user. Group 4 conducted a survey suggesting that consumers, on average, are willing to pay significant price premiums for products that have environmental characteristics or products from companies that have positive social and environmental ratings, if the information is available at the point of purchase. Ideally, a similar experiment should be conducted with the AWARE prototypes to see if these findings are duplicated when consumers make actual purchasing decisions in the marketplace using the device. Finally, group 7 developed a website to communicate information about AWARE and the student projects.

CONCLUSIONS:

Phase I of the AWARE project was successfully completed by involving a large number of students in the process through course project involvement. Several useful prototypes were developed, and initial market research suggests that access to information will indeed impact consumer purchasing decisions on average. Further research with market testing using the AWARE prototypes is needed to assess the number of consumers that would invest in and use such a device and verify that survey results can be reproduced with real market data.

PROPOSED PHASE II OBJECTIVES AND STRATEGIES:

Phase II for AWARE involves using the prototypes developed in Phase I to test the degree to which consumers alter their purchasing behavior when given access to product and producer information. Using this feedback, improvements can be made to the design, and an assessment of the level of impact of AWARE on the marketplace can be undertaken to see if a tipping point could be attained by producing and selling AWARE devices. A detailed business model must also be developed to generate a viable method of production, distribution, and sales without compromising the integrity of the data. In its current state, the AWARE software could be distributed free to consumers with PDA or mobile phone devices, but the convenience of barcode scanning requires financial investment.

Due to the stated EPA focus for Phase II on implementation, rather than further research, and due to constraints on funding allocation preventing payment of graduate student salary, we believe that, although Phase II of AWARE will provide interesting results that may generate positive impact, we do not feel that Phase II of the AWARE project meets the stated intent and restrictions of the EPA P[3] Funding. It is possible that at a future time, the needs of the AWARE project will be more aligned with the P[3] Phase II criteria, but it is not yet at that point.

PUBLICATIONS/PRESENTATIONS: http://www-personal.engin.umich.edu/~michalek/AWARE/

SUPPLEMENTAL KEYWORDS:

Sustainability, informed consumer, corporate social responsibility, barcode, responsible shopper, market forces

RELEVANT WEB SITES:

http://www-personal.engin.umich.edu/~michalek/AWARE
http://www-personal.umich.edu/~juampisn/aware%20main.htm