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COMPUTER-INTEGRATED FORECASTING FOR DEMAND-ACTIVATED PRODUCT DEVELOPMENT, MANUFACTURING, AND MERCHANDISING

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GOAL: Product developers in the apparel industry initiate the processes that links consumer preferences to retail sales. Their decisions are critical to competitiveness and profitability. However, the tasks performed by product developers are rarely considered part of a quick response strategy. The goal of this project is to prototype a workstation designed to enhance and integrate the product developers' information environment and upgrade the task-oriented toolkit.

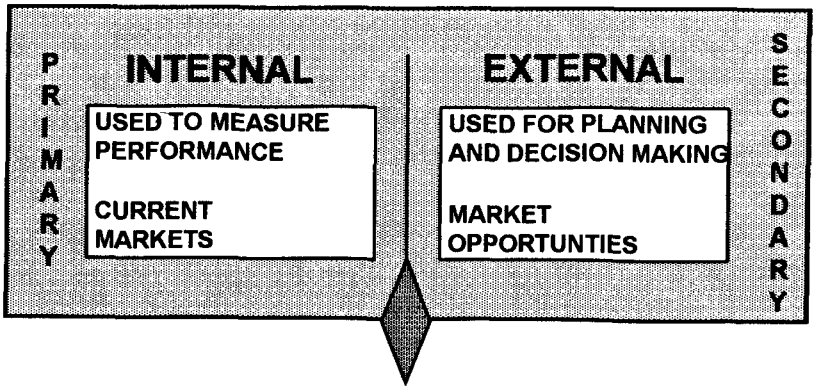
ABSTRACT: Demand-activated product development anticipates trends and facilitates timely introduction of merchandise into the market. This project treats the decisions of product developers as corporate assets that can be optimized to increase competitive advantage. The workstation prototype in this project integrates the information environment and product development tasks into a single workspace using off-the-shelf applications software, authoring software, advanced programming techniques, and, when appropriate, knowledge-based systems(expert systems, etc.). Within the workstation prototype efforts have been concentrated in four key areas: online environmental scanning, forecasting, specification writing, and multimedia reporting.

REPORT

Justification Quick response in fiber/fabric/fabricated products manufacturing means rapid replenishment of retail stocks using the sell one/replace one formula--a strategy that works well enough with basic items but not with fashion-driven styles. The problem with this approach is the assumption that consumers use a similar replacement heuristic in purchase decisions. In reality, consumers' preferences fracture into niche markets and product life cycles shrink from years to months. Product developers must forecast subtle shifts in consumer preferences and create matching merchandise concepts. Thus, the product developer provides direction for demand-activated product development, production, and merchandising by anticipating trends and facilitating the timely introduction of merchandise into the market. The speed-to-market advantage is amplified when the product assortments parallel consumers' needs, wants, and aspirations. This project treats product development decisions as corporate assets that can be optimized to increase competitive advantage.

Interviews with product developers showed that access to relevant information is limited and characterized by casual and haphazard information search and capture. Product developers indicated the need for more comprehensive access to information but only if such access was fast, convenient, and efficient. The workstation prototype is designed

to enhance and integrate the product developer's information environment by blending internal and external sources and to upgrade the task-oriented toolkit.



COMBINED FORECAST

Workstation Components The project utilizes off-the-shelf applications software plus authoring software, systems management software, and advanced programming techniques. When appropriate, the workstation employs knowledge-based systems and artificial intelligence approaches to enhance the users' decision making. The project team consists of specialists in social science research, statistical analysis, management information systems, development of neural nets and expert systems, and fashion analysis. Efforts have been concentrated in four key areas: online environmental scanning, forecasting, specification writing, and multimedia reporting.

Online Environmental Scanning Trend forecasting ability appears to an outsider as some combination of magic and luck. Instead the process involves very sophisticated environmental scanning techniques (Popcorn, 1991; Celente, 1991). This project aims to make some of these techniques accessible to apparel product developers. The product developer can then take the pulse of developing trends, screen concepts against the probability of consumer acceptance, and improve the success rate of new product introductions or line extensions. Improving the success rate by only a few percentage points can provide both competitive advantage and increased profitability.

Without extensive environmental scanning the product developer has too little information. With extensive environmental scanning techniques, the product developer has too much information, the wrong information, or information not organized for retrieval. These are the problems that the workstation prototype attempts to solve with online environmental scanning to continuously monitor information relevant to product development.

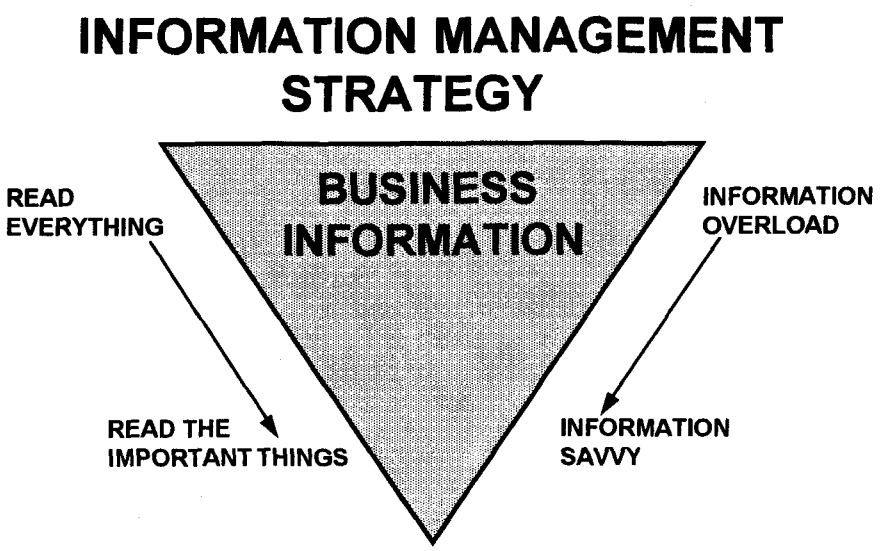
Why online environmental scanning? Online information utilities abstract articles--that is, they report the key points in one or two paragraphs--and continuously update that information (often daily). The Media Scan developed for this project consists of a set of

structured key word searches that can be customized by product category. Media Scan can be used in two ways:

☐ to locate background or summary information on an emerging issue.

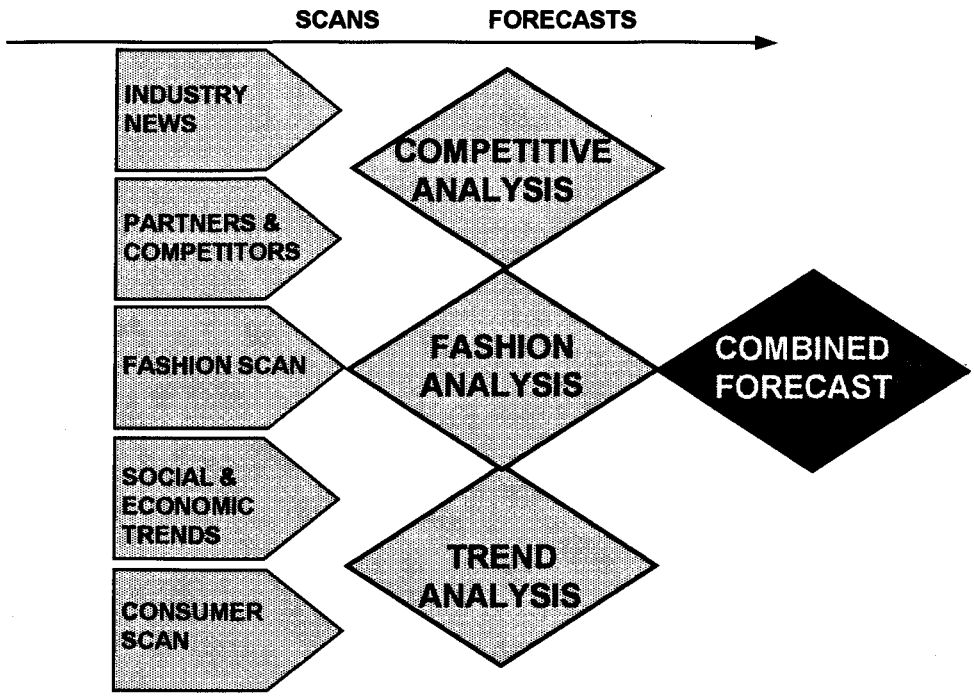
☐ to provide an individualized daily news digest.

In either case, the textile/apparel executive has access to essential information without the necessity of reading entire articles (however, articles of particular interest can be ordered from information utilities on- or off-line). In this way the executive avoids information overload while identifying useful information and managing it in a focused way (Garvin, 1993).

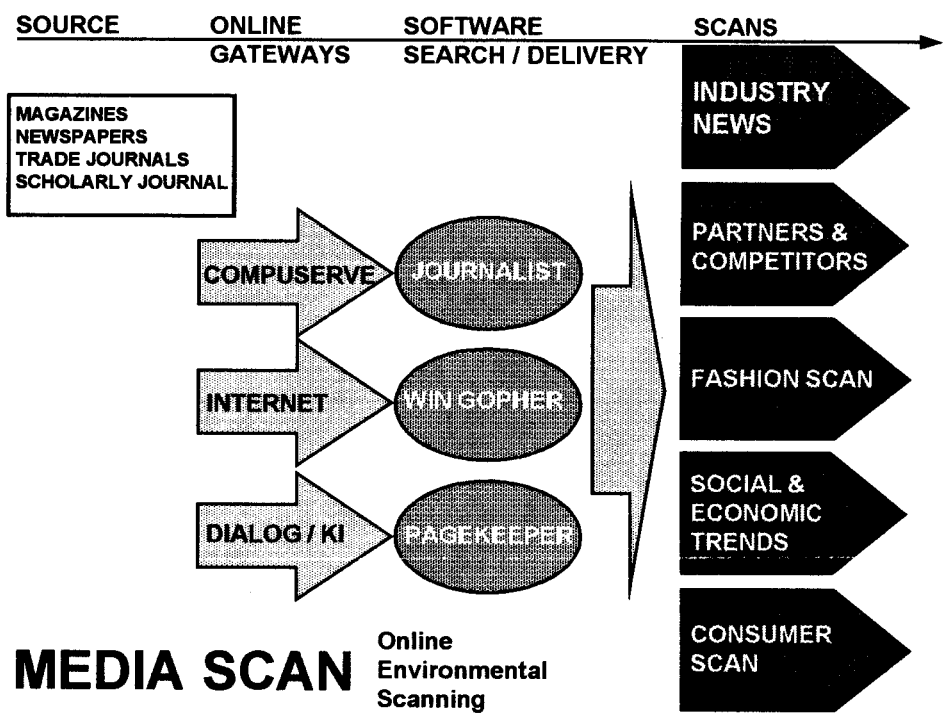


The Media Scan is organized into five mutually exclusive scans: Industry News, Partners & Competitors, Fashion Scan, Social & Economic Trends, and Consumer Scan. The first two scans parallel **competitor analysis** techniques (Fuld, 1985) by tracking emerging issues in the textile/apparel industry and monitoring activities of partners and competitors. The last two scans collect **trend information** on the societal level by tracking emerging issues and monitoring consumer segments as generational cohort groups and ethnic groups. The **fashion scan** monitors print information on three fronts: fashion trends, forecasters' predictions, and geographic areas where trends frequently emerge. The fashion scan information can be combined with shopping the market and other observational techniques to determine trend and style directions. Together, these scans use structured text retrieval to assist the product developer in creating a comprehensive combined forecast--competitor analysis, trend

analysis, and fashion analysis-- with increased efficiency and efficacy.



The Media Scan system prototype in this project utilizes three online gateways: Compuserve, Dialog/Knowledge Index, and Internet. Each gateway is associated with software for search, text retrieval, and delivery.



To produce an individualized daily digest, the Media Scan system work as follows:

Step 1--A software package on the workstation automatically dials an information utility daily during non-peak, lower cost hours and submits a customized search. The execution of that search results in the downloading of a population of abstracts to the workstation hard drive. In some cases, this population of abstracts is further evaluated, categorized, and prioritized based on a set of consistent criteria using expert systems and neural nets.

Step 2--The abstracts are imported into a personal document management software package where they become available for reading and processing by the apparel executive.

Step 3--Feedback from the textile/apparel executive in the form of grades the on usefulness of specific sets of abstracts can be used to fine-tune the search strategy.

The Media Scan system devised in this project assists the textile/apparel executive by:

☐ promoting a systematic approach to environmental scanning with timely access to critical information.

☐ reducing the flow of information to a manageable stream, minimizing problems with information overload.

☐ using off-the-shelf software to manage information for easy storage and retrieval.

Forecasting Two sources of information--point-of-sale (POS) data and consumer preference testing--are often cited as the best guides available to product developers. However, each has limitations in guiding product development decisions. POS data is most often formatted for sales executives rather than product developers. Further, POS data tells only what has sold at what price, not why consumers purchased what they did, consumer satisfaction with the use of products and likely replacement behavior, or what consumers looked for but did not find. Consumer testing via style preference testing, focus groups, and in-store testing of prototype garments all provide useful information to product developers. However, many companies fail to systematically integrate consumer testing into the product development process citing time or cost constraints as reasons. In-store testing is complex and costly to mount and suffers from many of the same drawbacks as POS data. Even among manufacturers who do in-store testing, executives say that the critical decisions on what to test and how often to test are made with limited access to relevant information. The Media Scan systeem provides enriched information support for product development decisions but the dilemma remains: how can the information be used to produce

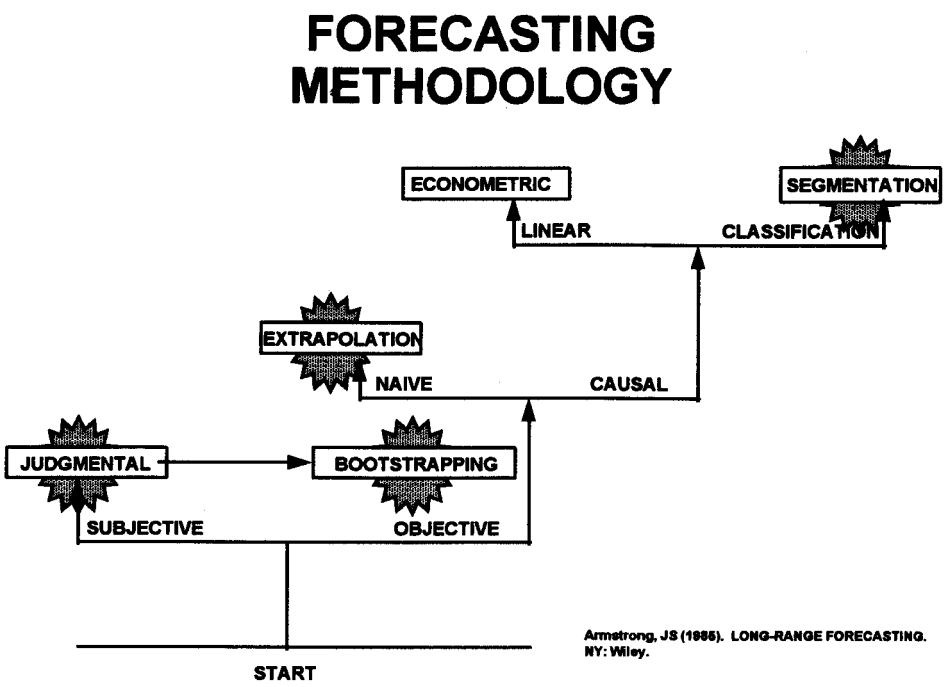
accurate forecasts?

The workstation provides two guides to forecasting methods: one for judgement-based forecasting and the other for analytical-based forecasting. Together these systems:

☐ provide access to all levels of forecasting methodology except econometrics.

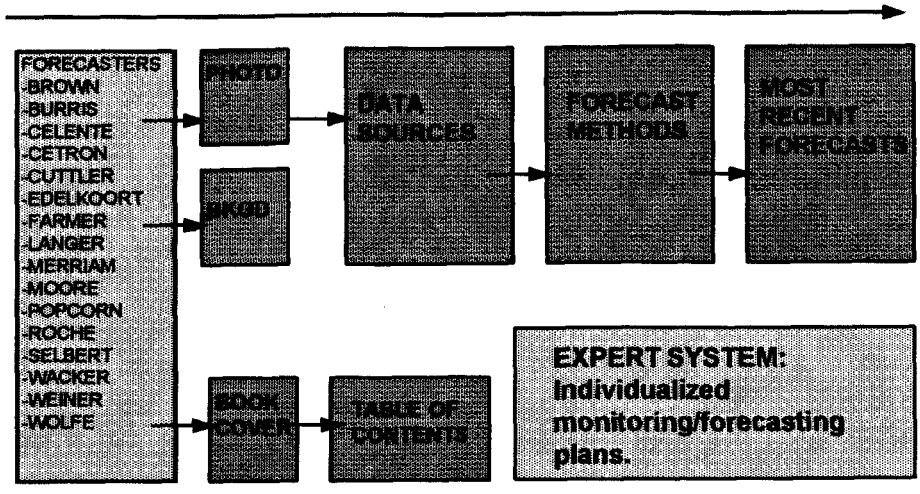
☐ assist product developers in selecting the best analysis strategy to produce accurate, valid forecasts.

☐ train product developers in the underlying assumptions of the various methods.



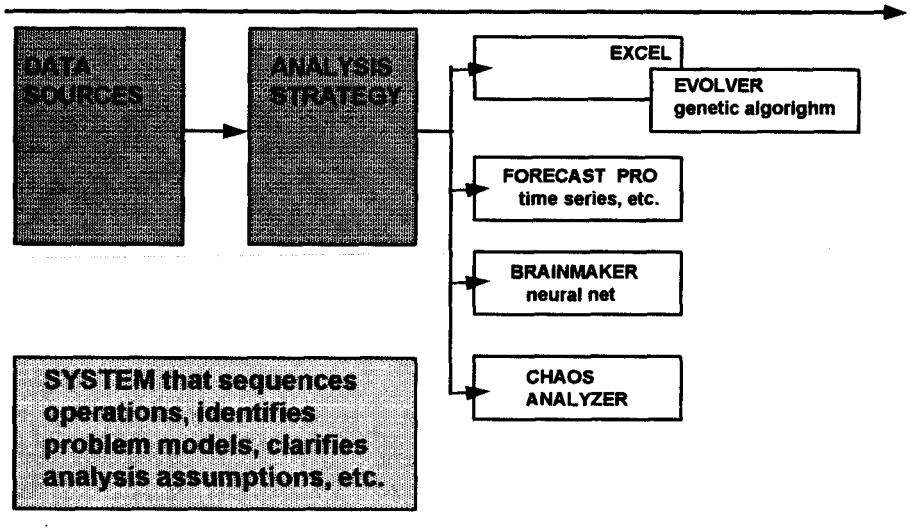
The Decision Support System for Judgement-Based Forecasting provides interactive access to the knowledge domain of forecasters. The system consists of a hypertext directory of forecasters and their techniques across the spectrum of social, economic, business, fashion, and color forecasting. Each entry contains a biography of a leading forecaster with information about their company affiliation, a summary of their methods, a list of their data sources, a client list when available, and copies of their most recent forecasts. In its final form, the directory will allow users to compare forecasting techniques, evaluate forecasters, and design individualized plans for judgement-based forecasting and trend analysis.

COMPUTER INTEGRATED DECISION SUPPORT SYSTEM for Judgement-Based Forecasting



The Computer-Integrated Decision Support System for Analytical Analysis integrates and accesses the features of several software packages (Excel, Forecast Pro, Evolver, and others) while providing guidance on selection and interpretation of the analysis. In this way, product developers who lack extensive training in analysis methods (time series, Markov chains, linear programming, etc.) can gain confidence and expertise while producing valid and accurate forecasts.

COMPUTER INTEGRATED DECISION SUPPORT SYSTEM for Analytical Analysis



Specification Writing Knowledge-based systems/expert systems can act as initiators, simplifiers, and receptors for the product development process. Together these approaches can be used to help preserve the assets lost to corporations when decision makers leave and speed transfer of these assets to new product developers. The workstation features two expert systems to help product developers write more accurate, cost effective initial specifications: one assists in selecting the correct care label, one guides design decisions based on apparel engineering principles. Together these expert systems demonstrate a way to capture technical expertise and make it available to product developers during specification writing. Technical expertise applied at an early stage in the product development cycle results in error reduction and saves time and dollars in the total process.

The Care Labeling Advisor prototype uses an expert system shell (VP-Expert) to deliver technical information to product developers on a need-to-know basis in an interactive format. Since many consumer problems and product returns can be tied to improper care labels and since most product developers are not well versed in textile science, The Care Labeling Advisor enhances the product developer's toolkit by improving the quality of initial specifications. The system has the potential to increased profitability by reducing customer dissatisfaction and returns.

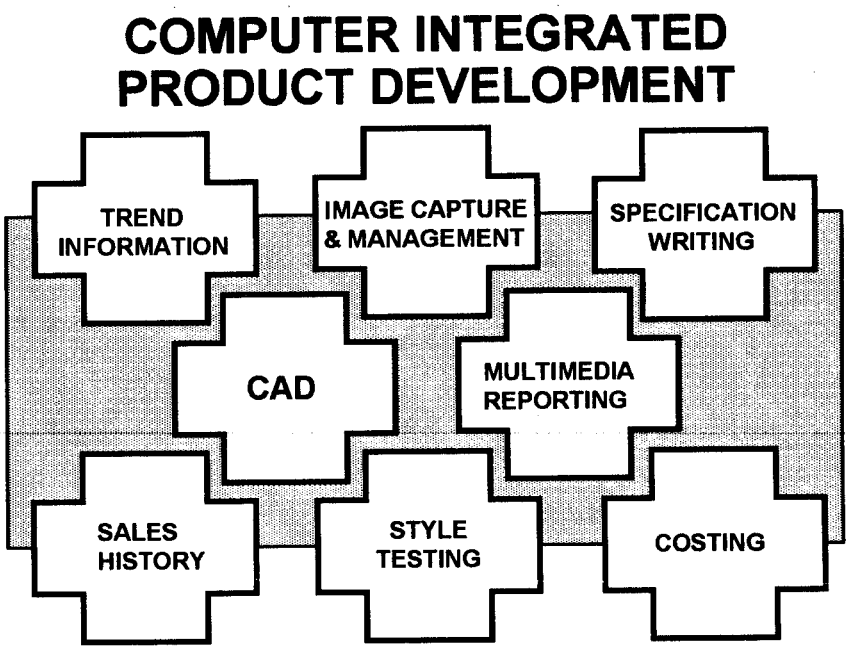
The Care Labeling Advisor for woven fabrics has been beta tested with novice and advanced product developers and validated by a textile scientist. Because of industry interest, a prototype for knits has been added and this revised system will be beta tested by Mervyn's product developers. Other industry contacts have also expressed interest in testing the system.

Interviews with executives at Vanity Fair and other apparel producers showed that the development process includes time for reconciling product developer's specifications with apparel engineering principles related to materials use, construction time, and complexity. The Apparel Engineering Advisor prototype uses an expert system shell (Nextpert) to inform product developers or marketing personnel of the engineering cost impacts of their proposed product's features while in the initial specification writing phase. Use of the Apparel Engineering Advisor is expected to reduce time spent on reconciling design and apparel engineering issues and to produce more accurate and cost efficient initial specifications. It may also invigorate the development process through early identification of positive trade-offs for the features and values most wanted by consumers.

Multimedia Reporting The workstation prototype in this project captures, stores, organizes, and retrieves visual, verbal, and numerical data. Information retrieved from online sources, captured from television and videotapes, scanned in from print materials and slides, and photographed with digital still video camera provide a rich visual resource for multimedia reporting on trends and forecasts. Computer-aided-

design (CAD) packages and drawing programs further expand the visual communication repertoire of product developers. Spreadsheet and forecasting software packages offer charting capabilities that turn numbers into graphics. Off-the-shelf photostyling, image management, and presentation software packages transform information from myriad sources into polished computer-based slide shows, overheaad transparencies, and handouts. Powerful laptop computers and computer conferencing equipment (projectors and adapters for TV monitors) make the whole process portable. Desktop publishing and color printers facilitate hardcopy versions of trend analysis and forecasts for distribution to sales staff and for style testing. Together these techniques equip the product developer to communicate trends, styles, and forecasts more quickly, accurately, and imaginatively than traditional methods.

Summary The workstation prototype has been designed to enhance and integrate the product developer's information environment and upgrade the toolkit to increase competitive advantage. The workstation demonstrates the potential in online environmental scanning, forecasting decision support systems, technical support for specification writing via expert systems, and multimedia reporting. Concepts from the workstation prototype can be adapted for large product development groups and small entrepreneurial companies, for single sites and globally dispersed offices, for an individual product developer or a networked decision-making team. Through the activities of this project, team members have built the expertise to advise textile/apparel/retail executives on the feasibility of fielded applications of these approaches within the industry.



Industry Contacts Contributing to the Development of the Workstation: Russell Corporation, Mast Industries, Cranston Printworks, Animated Images, Vanity Fair, Belk's Stores, June Roche, Carol Farmer, Janet Bevan (textile design consultant/ product developer, Wolverhampton, England), BhS (London), Jo-An Jenkins (fashion forecaster, London), ITBD Publications (London), Oxford Industries, Mervyn's

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Most Recent Publications/Presentation

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