ARCHITECTURAL CORRELATES OF PRIVACY: THE DYNAMICS OF PRIVACY REGULATION

by

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(ABSTRACT)

The study examines architectural correlates of privacy in an aerospace industry. Conceptual/theoretical notions are tested, whose ultimate value is the further refinement of privacy regulation, conceptually and operationally. Complexities of privacy as a concept and its regulation are clarified through theory and systematic information generated through the Heuristic Elicitation Methodology (HEM). The study demonstrates the usefulness and adaptability of the HEM to environmental design research.

The conceptual model of privacy regulation presented in the study guided the research and extends theoretical considerations regarding social, behavioral, and environmental mechanisms operating within the context of culture that are employed to regulate privacy in work environments. The model posits a comprehensive framework of privacy regulation and suggests a more detailed method for classifying regulatory characteristics.

The HEM provides a fairly definitive interpretation (i.e., understanding) of physical elements devised or deployed by designers that users perceive as regulating privacy, and where privacy fits into the users' perception

of what is important in their work environments. The information gathered is directly applicable to space planning standards and design practices at the aerospace industry, and pending further research, perhaps to a variety of other situations.

The study also lays the foundation for future research on the cultural variability of privacy regulation. The knowledge gained could be used to increase an organization's effectiveness by providing a framework for developing and then communicating culturally-sensitive space planning standards and design practices. In a broader context, the study stresses the importance of encompassing human values and technology in environmental design research.

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CHAPTER I

INTRODUCTION

This project examines privacy regulation through physical elements devised or deployed by designers that users perceive as regulating privacy in the work environment. The test challenge evaluates the internal validity of architectural correlates of privacy identified by Sundstrom, Town, and Brown, et al. (1982) through the Heuristic Elicitation Methodology (HEM). The project anticipates that the HEM also will elicit information on physical elements enabling users themselves to regulate privacy through their own locales and culturally-conditioned social and business practices. However, while these variables will be identified, the project emphasizes primarily physical elements devised or deployed by designers to regulate privacy.

A series of field studies conducted in the research of Sundstrom, et al. (1980) and Sundstrom, Town, and Brown, et al. (1982) determined that physical enclosure is correlated with privacy. The 1980 series of field studies also determined that privacy is correlated with satisfaction with the workspace and job satisfaction, regardless of job type. There were suggestive differences among jobs, which prompted the 1982 series of field studies. The 1982 studies investigated the physical correlates of privacy as a function of different job types. The researchers concluded that although privacy may contribute to an individual's satisfaction with the workspace, specific privacy needs associated with maximum satisfaction may vary with job type.

This project asserts that the physical correlates of privacy identified in the 1982 series of field studies are not inclusive. Physical elements analyzed in the field studies include the number of enclosed sides of the workspace; the number of workspaces in a room; workspaces within 25 feet; visibility of workspaces; amount of floorspace; and visibility to supervisor. <u>The physical elements investigated were predetermined by the researchers and may not exhaust the range of user perceptions concerning the physical correlates of privacy.</u>

THEORETICAL CONSTRUCT

The construct for privacy regulation holds that social, behavioral and environmental mechanisms operating within the context of culture are employed to regulate privacy within work environments. These mechanisms are defined as follows:

(1) <u>Environmental mechanisms</u> are the physical elements that facilitate or impede privacy regulation in the designed environment. These mechanisms are devised or deployed by designers and/or enable users themselves to regulate privacy through their own locales. The elements are composed of field characteristics and barriers. Field characteristics regulate privacy by perceptually altering the physical context through shape, size, orientation, and environmental conditions. Barriers regulate privacy physically and symbolically through walls, screens, objects, and symbols.

(2) Behavioral mechanisms are the cognitive and overt behaviors people use to "modify" themselves to conform to the environment and/or to modify the environment. These behaviors regulate privacy through environmental screening, a cognitive behavior; and through overt behavior, nonverbal/verbal behavior, territorial behavior, and the use of personal space.

(3) Social mechanisms are policy and social supports governed by the cultural institution through accepted practices, mores, rules, and roles in the behavior setting. Work environments constitute the organizational climate within which privacy regulation takes place. They represent a cultural institution as institutional occupation systems. Policy and social supports facilitate or impede privacy regulation through the structuring of activities in space and time.

These three mechanisms operate within the overall context of culture, and are mediated by three cultural domains: psychological processes; social legacy; and adaptation to other groups. Behavioral mechanisms regulate privacy through psychological processes. Social mechanisms regulate privacy through institutional policies and social norms culturally patterned after social legacy and through adaptation to other groups. (Adaptation of work groups to accepted social practices, mores, rules, and roles in a behavior setting is patterned by how groups relate, adapting to different positions.)

Behavioral, social, and environmental mechanisms are further mediated by a subsystem of cultural and environmental elements: emic values and beliefs; patterns of language; and material culture, in particular, the transformed physical environment. These elements evolve from and are simultaneously influenced by all three cultural domains. Emic values and beliefs constitute the common core of consensus that a culture shares to communicate "meaning." Cultural contexting patterns that communicate contextual cues for privacy regulation are predicated upon emic values and beliefs. Patterns of language, as ways of communicating, condition verbal/nonverbal behavior for privacy regulation through formal and informal education.

Material culture is an environmental outcome or reification of culture that appears in the transformed physical environment and in objects. People interact with the silent messages communicated by the physical environment, a major resource of material culture. The physical environment communicates the cultural meaning of environmental mechanisms as privacy regulators through mnemonic cues embedded within or encoded into the environment. These cues are interpreted by the user. If the code is not decoded by the user, it is not shared nor understood, and the environment fails to communicate. Built environments that do not communicate lack compatibility in environmental meaning and can be perceived as disorienting and stressful (Rapoport, 1983).

SPECIFIC AIMS OF THIS RESEARCH PROJECT

The specific objective of this project is to identify physical elements devised or deployed by designers that users perceive as regulating privacy in the work environment. The test challenge evaluates the internal validity of architectural correlates of privacy identified by Sundstrom, Town, and Brown, et al. (1982). The present project asserts that the physical correlates of privacy identified in the research of Sundstrom, Town, and Brown, et al. are not inclusive.

Becker (1985) argues that research to date on the physical setting of the work environment has been largely atheoretical. The research trend has been problem-centered with less emphasis on refining or extending theory. This research project, both problem-centered and theory-centered, has three research goals:

(1) To refine and extend theory on the architectural correlates of privacy in the work environment.

(2) To demonstrate the usefulness of the Heuristic Elicitation Methodology in targeting user needs and purposes.

(3) To provide a model of the social, behavioral, and environmental mechanisms operating within the context of culture that are employed to regulate privacy in work environments. The model guides the development of a "descriptive system" of privacy regulation, identified through the Heuristic Elicitation Methodology.

SIGNIFICANCE OF THE PROBLEM

Refinement and Extension of Theory for Better Privacy Management

Altman and Chemers (1980) hypothesize that the "psychological viability or well-being of people and groups centers on the successful management of privacy" (p.81). Goodrich (1982) reviewed seven office evaluations and reported that the "designed environment affects, both positively and negatively, morale, communication patterns, perceived privacy, and workers' relationships with others" (p. 353).

How to successfully manage privacy in today's automated office is an urgent issue in facility design and management. Privacy is a rare commodity for most office workers. The inability to hold confidential conversations (i.e. secrecy), lack of control over accessibility and the inability to avoid crowding, lack of autonomy over supervision, and distractions and interruptions can contribute to negative effects on job satisfaction (Sundstrom, et al., 1980). Poor privacy conditions have the potential to create economic costs for organizations (BOSTI and Brill, et al., 1984; 1985). This has economic ramifications in two spheres: (1) facility construction costs are tripled over a building's life-cycle due to alteration costs; and (2) the even more significant relationship between appropriateness of the work environment and the effectiveness of the organization sheltered in that environment. The growing literature on how the environment affects mature and technically advanced economies substantiates this (ARCC, 1985).

Environmental mechanisms facilitate or impede privacy regulation as an integral part of the designed environment. On the positive side, the aesthetic quality and comfort of the physical environment can enhance the user's mood and morale, while the social environment can be a source of interpersonal support and camaraderie. On the negative side, intrusive levels of noise, poor ventilation, and frequent distractions and interruptions can promote frustration and dissatisfaction with one's job (Stokols, 1985).

Targeting User Needs and Purposes through HEM

Research to date on the physical setting of the workplace has utilized surveys targeting attitudes and preferences as well as postoccupancy evaluations that assess user responses to office environments (Becker, 1985; Sundstrom, 1986). The methods used to operationalize research questions on privacy indicate that the major limit of privacy research to date is its failure to expose the personal constructs of the research subjects, the users of the environments examined. The typical survey is not in the user's language, so there may be little shared meaning of privacy as a concept; and the range of responses does not exhaust the user's perception of privacy, privacy needs, and privacy regulators.

The problem is magnified by the adoption of the traditional positivist model to environmental design research that is not capable of dealing with all the issues central to the study of environment and behavior. The positivist model requires the researcher to make a sharp conceptual distinction between the knower (i.e., the researcher) and that which is known (e.g., "facts"). To the positivist, the "facts" of human behavior are empirically real and exist independently in an external objective reality (Bredo and Feinberg, 1982; Eisenhart, 1985).

The articulation of user needs and purposes is not amenable to positivist approaches (Patricios, 1987; Ventre, 1986a; Weisman, 1983). Ventre (1986a), a constructionist, argues that because the quality of experience is subjective for user needs and purposes, knowledge is legitimized through authenticity--not whether or not it is verifiable. That is, human beings constitute or establish what counts as knowledge. "Facts" of human behavior are social constructions existing only by social agreement or consensus.

The Heuristic Elicitation Methodology (HEM), an interpretivist approach, will be employed for the present project. The HEM, though rarely used in work environments, offers great potential in targeting user needs and purposes. This holistic inductive approach seeks to understand the total unifying nature of the research setting. It is inductive, as the researcher does not specify main variables or specific hypotheses beforehand. Main variables are not predetermined--they are elicited based on the personal constructs of the user (Werner and Schoepfle, 1987).

APPROACH: THEORY/METHOD

Theoretical Foundation

The perception of privacy is dependent upon the accepted social practices, mores, roles, and rules governing the behavior setting

(Kira, 1976). The usefulness of the Heuristic Elicitation Methodology in targeting user needs and purposes becomes even more apparent when dealing with other cultures whose cultural meaning of social situations may not be the same. The meaning and clarity of privacy cues can differ across intra-office settings even within the same culture (Justa and Golan, 1977).

Behavioral and social scientists have advanced several definitions for privacy (see the reviews by Altman, 1976, 1977; Altman and Chemers, 1980; Margulis, 1977; and Pennock and Chapman, 1971). Concepts of privacy have emphasized one of three central themes: retreat from people (Bates, 1964); control over information (Westin, 1967); and regulation of interaction (Altman, 1975). Privacy within the work environment involves all three themes, but typically refers to the regulation of interaction or communication (Sundstrom, 1986).

Altman's (1975) definition of privacy is the most comprehensive, encompassing the definitions of Bates (1964) and Westin (1967). It is the "selective control of access to self or one's group" (p. 18), with the central theme being the regulation of interaction. The present project, drawing upon the research of Altman (1975, 1976, 1977); Altman and Chemers (1980); and Sundstrom (1986), defines privacy as a psychological state associated with the regulation of interaction between the self and others and/or environmental stimuli.

Altman describes privacy as a boundary-regulating process that is dialectic in nature. Privacy is, for Altman, an interpersonal process, whose object is optimization. Westin (1967) theorizes that there are four psychological functions of privacy: the need for autonomy; the need for self-evaluation; the need for emotional release; and the need to allow for protected and limited communication with others. Altman argues that these functions are all in the service of the main psychological function of privacy, which is to maintain self-identity. Poor boundary definitions, according to Altman, can lead to psychological problems. Blatt and Wild (1976) propose that mental disorders, such as schizophrenia, are due to the patient's inability to separate himself/ herself from others. The patient perceives that "they" are part of the world and do not perceive "themselves" as separate or distinct from others at any time.

Kaplan (1977) utilizes Maslow's (1943) Hierarchy of Needs to examine privacy. Kaplan postulates that privacy falls under "safety and security", the second basic need after "physiological needs." This itself is a cue to the importance placed on privacy in American culture.

Cultural Variability of Privacy Regulation

Altman (1975) was the first to theorize that privacy is a cultural universal. Altman's cross-cultural research of privacy regulation in developing countries reveals that what differs is not that the need for privacy is present, but the ways in which that need is met, the ways that privacy is regulated. The cultural variability of standards indicates that such variability exists in the work environment of developed countries as well, though no cross-cultural studies have empirically examined privacy regulation in this setting (Belcher, 1985; Rapoport and Watson, 1967-1968).

Privacy Regulating Mechanisms

Altman provides a conceptual framework of privacy regulating mechanisms used to withdraw from interaction or to seek it out (1975; Altman and Chemers, 1980). These are environmental behavior (territoriality and personal space); nonverbal and verbal behavior; and cultural practices. They operate in different combinations as a social system. Altman considers environmental mechanisms to be another regulator, but does not include them in the conceptual framework.

Altman's theoretical framework is the most applicable to the investigation of privacy regulation in the work environment (Sundstrom, 1986). Altman's concept is expanded in the present project to include environmental stimuli and additional privacy regulating mechanisms. The model depicted in Figure 1 conceptualizes a more holistic framework of privacy regulation than previously provided. The model stipulatively identifies social, behavioral, and environmental mechanisms operating within the context of culture that are employed to regulate privacy in work environments. It draws upon the research of Altman (1975, 1976, 1977); Altman and Chemers (1980); Hall (1966); Justa and Golan (1977); Rapoport (1976); Sundstrom (1982, 1985, 1986); Sundstrom, et al. (1980); Sundstrom, Herbert, and Brown (1982); Sundstrom, Town,and Brown, et al., (1982); and Zeisel (1984). The model is discussed at length in subsequent sections.

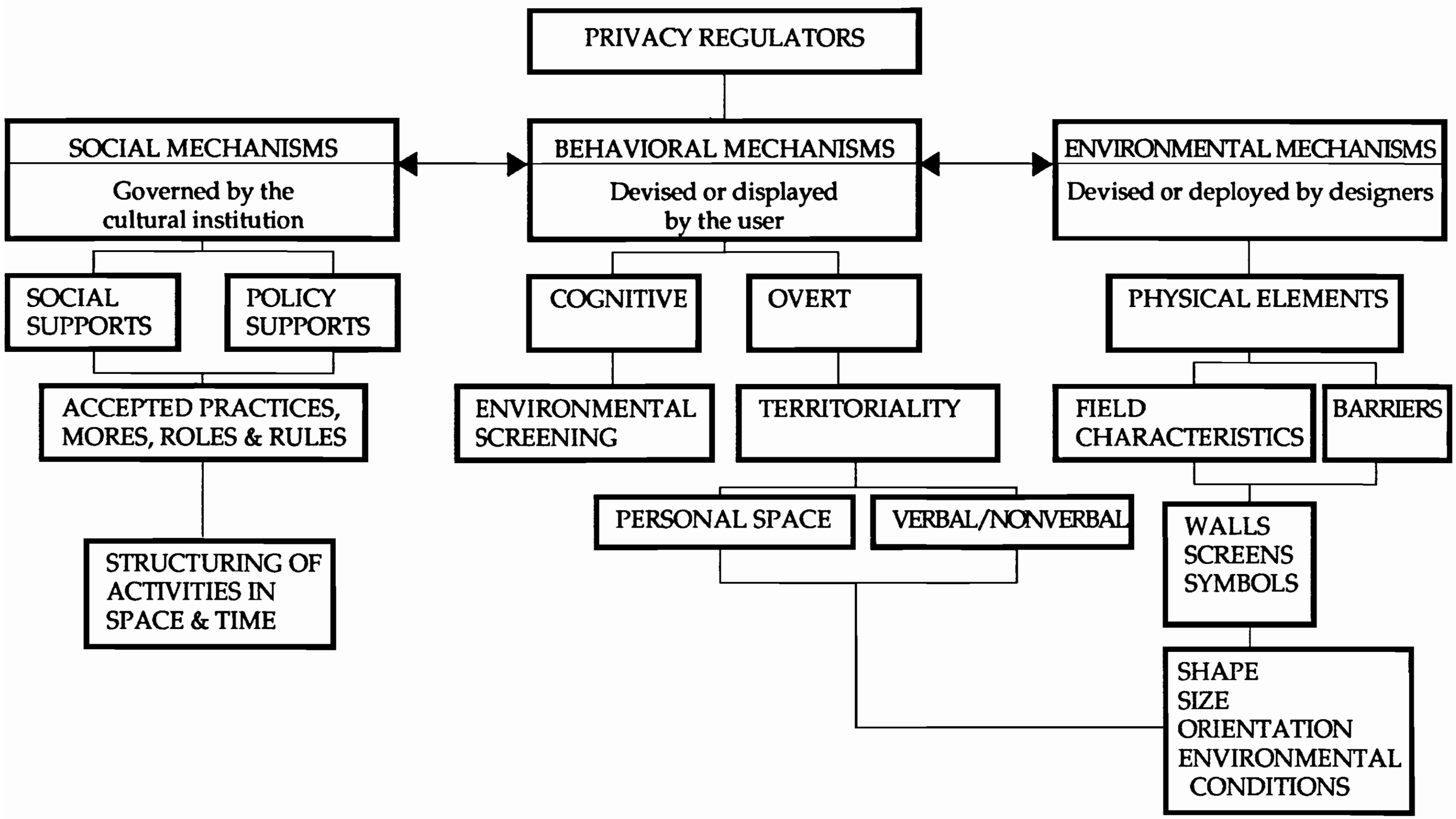

Figure 1 Conceptual Framework for Privacy Regulation.

Methodology

The specific objective--to identify physical elements devised or deployed by designers that users perceive as regulating privacy--will be approached using the Heuristic Elicitation Methodology. This method is designed to analyze complex issues, such as privacy regulation, by exhausting the range of the respondent's perceptions concerning the variables being examined, to determine beliefs associated with privacy issues, and to identify interrelationships among privacy issues. The underlying assumption is that it is possible to match particular items and attributes with particular cultural values (Harding and Livesay, 1984).

Stage 1--Domain Definition

The Domain Definition, a cognitive ethnographic method, is designed to exhaust the range of the respondent's perceptions of the variables being examined. It will identify domains through semantic relationships in terms of behavior, artifacts, and knowledge that people have learned or created. The domain is a set of categories organized on the basis of a single semantic relationship. A series of interlinked questions is used to elicit:

(1) The respondent's meaning of design features, and social and policy supports as privacy regulating mechanisms. This helps to control for rival factors as accommodating privacy needs cannot exclusively be achieved through manipulation of design features. The social and policy supports of the work environment must also be considered (Justa and Golan, 1977).

(2) Where privacy fits in the respondent's perception of what is

important to the user in the work environment. This further helps to control for rival factors--there may be intrinsic and extrinsic management factors that have a greater influence on user satisfaction with the work space than privacy.

Spradley (1979, 1980) stresses that the use of structured open-ended interviews in the language of the respondent decreases the likelihood of overlooking significant attributes of the domain being examined due to a lack of communication (i.e., shared meaning of concept).

Stage 1--Method of Analysis

The raw data will be analyzed through content analysis in order to exhaust the domain (Spradley 1979,1980) and to generate theory grounded in data.

Stage 2--Beliefs Elicitation and Preference Ranking

The Beliefs Elicitation will be used in order to identify which design features the respondent perceives as regulating privacy, and to determine interrelationships among variables. It is important to distinguish between design features perceived as regulating privacy from design features perceived as relating to other office attributes identified in Stage 1, such as physical comfort or the management of information flow.

Information will be elicited through structured interviews in which the respondent answers yes or no to questions in a matrix format. The questions reflect the domain analysis conducted in Stage 1.

Preference Ranking will be conducted in order to determine priorities based upon respondent perceptions of design features that help to regulate privacy.

Stage 2--Method of Analysis

The raw data of semantic relationships from the Domain Definition form the basis for quantitative analyses such as frequency counts and mean rankings. Werner and Schoepfle (1987) encourage combining qualitative data with quantitative data as it offers additional insights and breadths:

(1) It helps to reduce complexity through quantitative summation of the rich detail provided in the Domain Definition.

(2) It enables the researcher to generalize to a larger population (i.e., the sample size can increase during this phase).

(3) The ability to generalize increases external validity.

(4) The use of multiple methods of data analysis helps to increase internal validity.

(5) Alternative classifications are possible through the Beliefs Matrix, examining taxonomic and componential relationships. Further classifications are possible through Preference Ranking. For example, design elements associated with privacy regulation may be considered more important than other design elements not associated with privacy regulation.

Methodological triangulation through field observation and photodocumentation will be used throughout the study in order to increase reliability and validity.

CONCLUSION

This project attempts to clarify the complexity of privacy as a concept and its regulation. The project tests conceptual/theoretical notions still in their formulative stage, whose ultimate value is the further refinement of privacy regulation, conceptually and operationally. The project will provide a fairly definitive interpretation (i.e., understanding) of physical elements devised or deployed by designers that users perceive as regulating privacy, and where privacy fits into the users' perception of what is important in their work environments. The information gathered will be specific for facility design and management purposes. Providers of office equipment/furnishings and products/services can use the knowledge gained from this research project to enhance the management of privacy in today's automated office.

The project also lays the foundation for future research on the cultural variability of privacy. The knowledge gained could be used to increase an organization's effectiveness by providing a framework for developing and then communicating culturally-sensitive space planning standards and design practices. The globilization of what were once national industries or firms has brought a crisis in corporate communication: people are dealing with other cultures continually. But reliable, systematic information on privacy regulation in industrialized countries is not available. If culturally-sensitive space planning standards reduce the need for changes induced by cultural incompatibility, then they could help control alteration costs.

REVIEW OF LITERATURE

CHAPTER II

CONCEPTUAL FRAMEWORK FOR ACCOMMODATING CULTURE AND ENVIRONMENTAL RELATIONS IN DESIGN DECISIONS

This chapter proposes a conceptual framework for accommodating culture and environmental relations in design decisons that can be applied to an investigation of privacy regulation in work environments. This is premised upon a cultural theory perspective. Work environments constitute the organizational climate within which privacy regulation takes place. Sundstrom (1985) describes "climate" as the organization's "unique values, style, culture, or collective personality" (p. 189). More specifically, work environments represent a cultural institution as institutional occupation systems. Wineman (1986) examines the nonphysical part of work environments as an "organization's culture":

> By instituting a normative pattern of behavior to achieve its goals and establishing a value system that supports its goals, the organization begins to develop a culture that provides a sense of common meaning and purpose to its members. Through the control of the tempo of its activities, the interaction among its members, the training of new members, and rewards, the organization's culture is reinforced and becomes the means by which it communicates its essential nature to outsiders and insiders. In this way, the organization defines its relationship to the contextual environment in which it exists. A corporation's culture creates its corporate identity by institutionalizing the appropriate patterns of behavior, establishing a belief system that ties the employees to the company, and defining the corporation within its business environment. (p. 5)

Social legacy, psychological processes, and adaptation to other groups are fundamental cultural domains operating within all cultural institutions. Emic values and beliefs, patterns of language, and material culture evolve as a subsystem, simultaneously influenced by these three domains. The present project examines individual and interpersonal perceptions of privacy regulation within the transformed physical environment, a reification of material culture.

Low (1986) argues that concepts of privacy are cultural principles with physical expressions that can be identified and made explicit. Archea (1977) encapulates the dynamic influence of the environment on interpersonal behavior, in particular privacy regulation, in this way:

> No matter how we conceptualize privacy, we cannot escape the fact that the behavior required to attain or maintain it occurs in an environment for which physical properties can be specified. (p.134)

The present project asserts that those physical properties represent physical traces of culture, and seeks to identify physical elements devised or deployed by designers that users perceive as regulating privacy in the work environment. The physical environment may facilitate, inhibit, or be neutral as a communication tool; thus it is intimately linked with culture (see Rapoport, 1976).

Leading environment and behavior theorists Hall, Rapoport, and Altman examine the relationship between culture and environmental relations, stressing different tenets. The present discussion draws upon their research in an effort to test their concepts by applying them to the study of privacy regulation in work environments; and evaluating the validity, or at least the usefulness of these concepts.

CULTURE AND ENVIRONMENTAL RELATIONS

Culture

Woods (1975) provides an overview of theretical constructs of culture, pointing out that many of the early definitions attempted to cover too much, with little utility as a descriptive or explanatory concern. Later definitions were less general, but varied according to the orientation and intent of the definer. (See Kroeber and Kluckhohn who identify several hundred uses of the culture concept in their 1952 review of literature.)

Goodenough (1961) suggests that concepts often blur the distinction between culture as patterns of behavior and culture as patterns for behavior, and many times use the two senses of the term interchangeably. Culture refers to a way of life in the former case, and to the design for that way of life in the latter. Sole emphasis on the design for a way of life hints at cultural determinism, which excludes individual variability, voluntarism, and autonomy.

Woods (1975) stresses the importance of individual variablity, summarizing Goodenough's 1961 description of culture:

> The culture concept can best be utilized as a mental construct--a sort of cognitive map which provides the individual with appropriate rules for behavior in various situational contexts. Some of these "rules" are idiosyncratic to the individual, some are shared with some members of the group, and others are shared with most members of the group. Those which are shared with most members of the society lead to "behavior patterns characteristic of the group" and compromise

> culture in the traditional sense. So culture is shared but not completely. Individual variability can be recognized. (p. xii)

Recent scholarship deemphasizes the quest for a universally accepted definition of "what culture really is" and focuses instead on a particular range of social phenomena that is important for the purpose at hand (Cole and Scribner, 1974). The present project examines the interrelationship between culture and environmental relations as the pertinent social phenomena.

Fundamental cultural domains are displayed in Figure 2, reflecting the designed portion of the environment within the naturally occuring one (see Herskovits, 1952). Although the natural environment may play an important role in culture, it is not predetermining. Cultural practices often induce alterations of the natural environment, and diverse peoples in similar environments may affect totally different cultural practices (Rapoport, 1969). Culture can affect the natural environment, the natural environment can affect culture, or the two may be independent.

Altman and Chemers (1980) provide a slightly different configuration of culture and environmental relations. They identify five cultural domains: the natural environment (topography, climate, flora, and fauna); environmental orientations and world views (cosmology, religion, values, and norms); environmental processes and behaviors (privacy, personal space, territoriality, and crowding); environmental outcomes (built environment, homes, farms, and cities); and

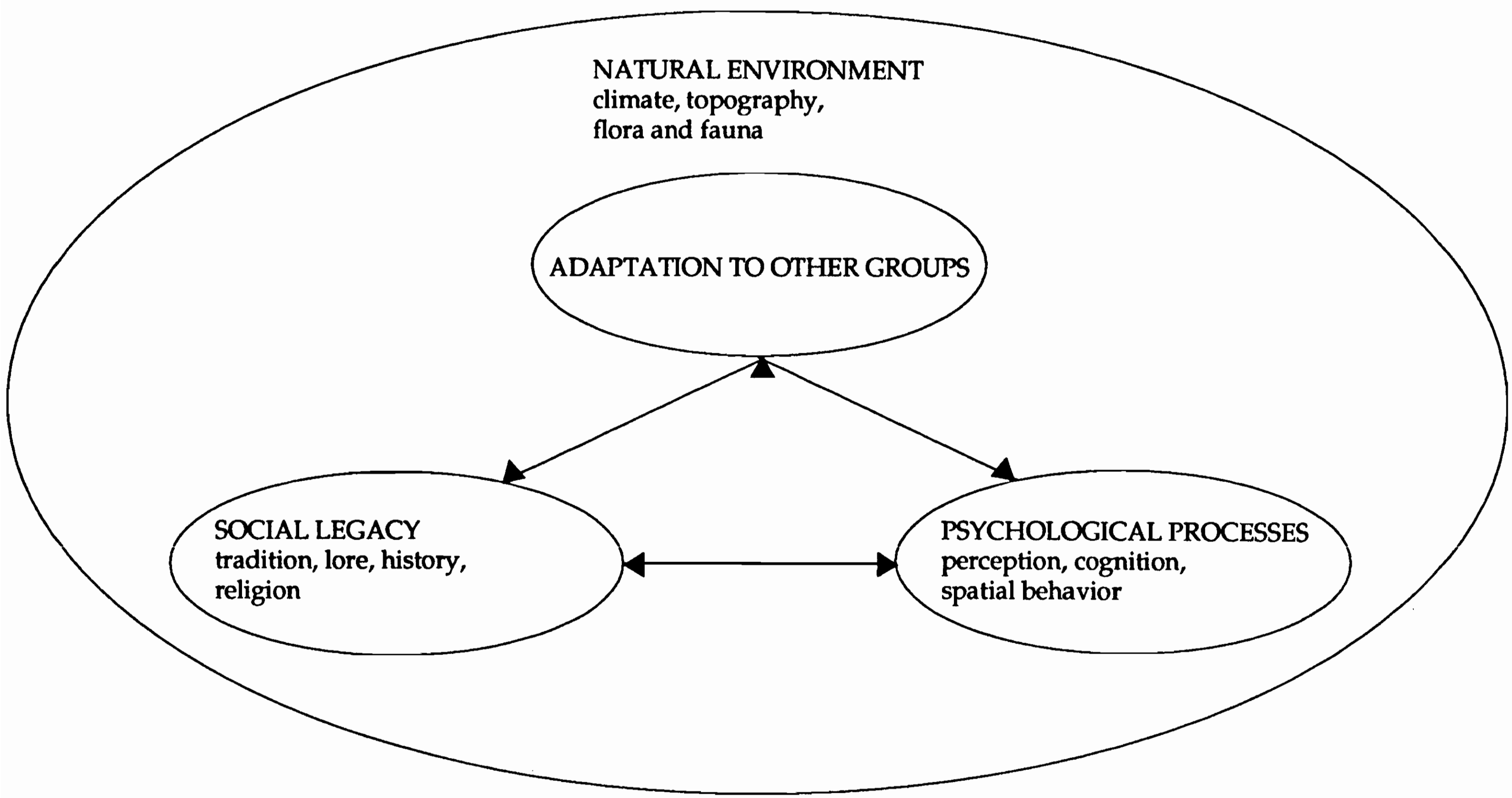

Figure 2 Model of Culture and Environmental Relations

environmental cognitions (perception, coding, memory, and judgements). Each domain is examined on the same level of analysis.

The present project proposes that certain cultural and physical environmental elements identified by Altman and Chemers evolve as a subsystem and should be examined on a different level of analysis. Emic values and beliefs, and environmental outcomes as material culture are part of this subsystem, influenced simultaneously by three fundamental cultural domains. Altman and Chemers' framework also omits "adaptation to other groups," even though it is a vital component of culture.

The present project asserts that social legacy, adaptation to other groups, and psychological processes are part of an integrated system in which each cultural domain is functionally interrelated with the other domains. The domains are mutually reinforcing. This orientation concurs with Altman and Chemer's (1980) perspective. It draws upon Berry's (1975) "weak" version of culture and environmental relations: These forces are part of an interdependent ecosystem in which cultural and environmental elements are interrelated in networks and patterns of dependencies. Hard and fast causal relations are not established.

Bennett (1982) criticizes Altman and Chemers' perspective for omitting the "institutional imperative, economic compulsions, or power systems that shape the use of physical resources in modern society" (p. 622).

Bennett contends that the economic arrangement of people and resources in a group must be understood in order to understand culture. This is a positivist model, emphasizing the economic base as generating the social reality of a superstructure. Superstructures (i.e., cultural institutions) include institutional occupation systems, education, the family, and the church. Bennett's position stresses economic adaptation, indicative of social theory that incorporates a structural approach. The structural approach does not recognize individual variability, voluntarism, or autonomy. Researchers utilizing a structural approach rely on different cultural domains for analysis and explanation.

For instance, Kaplan and Manns (1972) in an overview of theoretical orientations, point out that Steward (1953) identifies technoeconomics, sociopolitical organization, and ideology (social legacy) as the fundamental cultural domains in his structural approach. (Kaplan and Manns describe technoeconomics as including not only the technology of machines and tools employed by a given culture, but also the way machines and tools are organized for use and the scientific knowledge accompanying them.) The structural approach focuses on the institution, a collectively organized phenomeonon, and examines the structure of the social system as the central element of explanation. Focus on the institution is reflected in Steward's (1953) structural approach, described by Kaplan and Manns (1972):

> While the core institutions of any culture may include ideological, sociopolitical, and technoeconomic elements, the technoeconomic factors figure most prominantly in defining and forming the strategic features of any society. (p. 47)

Harding and Livesay (1984) summarize this orientation:

> As with any collectivist approach, there is a tendency to reify the structural model. One result is that the social structure sometimes comes to be viewed analytically as generating the social reality. The socio-cultural environment is seen as the result of the action of social forces on the group members. The goal of research is to seek out the basic dynamic, i.e., the social forces, and to explain the group life with reference to the character of its underlying structure. (p. 66)

The present project, along with Altman and Chemers' perspective, emphasize cultural theory that incorporates a <u>perceptual approach</u>. (This is not to be confused with environmental perception and structure of stimuli.) Harding and Livesay (1984) contrast the structural approach to this perspective:

> The events and phenomena of social life are examined by researchers with this perspective not so much to reveal an underlying structure of social forces but to understand the dynamics of actors in social process. Analysts tend to assume a background of social factors as a context within which individuals' perceptions, motivations, and personal or social identities are the focus of interest.... The starting point of the analysis of social reality in this approach is <u>reality as perceived by the actors</u>. (pp. 66-67)

The perceptual approach is an interpretivist model, interpreting culture through ideologies and meanings, cultural models, and cultural constructions. It recognizes individual variability and is concerned with the subjective (e.g., personal view) and intersubjective meanings that develop between people. Marriage is an example of a cultural model as a "meaning system." "Meaning" is a cultural construction, that is, a human way of categorizing or representing culture. Cultural constructions, according to Eisenhart (1987), accomplish four things:

(1) They categorize reality (legitimized by social consensus).

(2) They constitute reality, providing tools to understand how to organize one's life. (Choosing to get married versus living together is an example of this, constituting reality through meaning systems.)

(3) They are a directive force. (Within cultural models, there are things that are considered to be right and wrong by the collective society.)

(4) They are evocative. (Emotions are evoked when a cultural model is not adhered to, such as in divorce.)

Harding and Livesay's (1984) comparison of structural and perceptual approaches targets public policy, yet it is equally applicable to environmental design research and the investigation of privacy regulation in work environments. Theorizing on the impact of the physical work environment typically emphasizes three levels of analysis, reflecting the perceptual approach: the individual worker; interpersonal relationships; and the structure of the organization as a whole (see Sundstrom 1985, 1986). Harding and Livesay, for both theoretical and instrumental reasons, conclude that the analysis of a given social situation should begin at the perceptual and proceed to the structural aspects:

> This movement is indicated by the nature of and relationship between these two dimensions of social reality. Subjective meaning and interaction are grounded in the autonomy of actors, but are conditioned by the pattern of social systems. This connectedness is apparent from the perceptual viewpoint, not only because it examines the process of the constitution of social relations, but because that perspective concerns the domain held by individuals that is explicitly about their social structure. That is, it reveals the structure of society as it most directly affects the actions and decisions of group members. One can only infer from the analysis of structure, as such, the subjective meanings of the population being studied.... Conventional structural models consist of indicators such as "income", "level of social services", or "socioeconomic status" which may identify elements of broader social forces at work. However, little attention can be given to a target community's specific perceptions. These perceptions and resulting actions lead to specific modifications of the group's particular variant of social life within the social system. By beginning policy-focused research with careful investigation of (a) the knowledge held by members of the group in the immediate situation and (b) the possible or actual reactions to change and its impacts; the perceived reality, patterns of action, and specific organization of the group can be positioned within the social structure. (p. 70)

The present project seeks to identify physical elements devised or deployed by designers that the user perceives as regulating privacy in the work environment. Once the user's perceived reality is understood, this information can be positioned within the social structure of work organizations through culturally-sensitive space planning standards and design practices. Low (1986) proposes:

> Designers are culture-makers in the sense that they give form to our cultural ideals, beliefs, and norms. They therefore are responsible for understanding the complex relationship of culture and place and culture and built form. (p.67)

Social legacy embodies tradition, lore, history, and religion. These attributes are institutionalized. Adaptation to other groups acknowledges how a group relates to other groups, adapting to different positions. Sundstrom (1985) argues that theories on the impact of work environments have rarely emphasized adaptation, even though adaptation can modify the impact of many variables (collectively, or on individual and interpersonal levels). The following chapter discusses the impact of technology on individual and interpersonal adaptation; see also Dubos, 1980; Helson, 1964; Sundstrom, 1985; and Wohlwill, 1974.

Psychological processes incorporate perception, cognition, and spatial behavior. Altman and Chemers (1980), taking a slightly different position than this, argue that privacy regulation occurs in the domain of "environmental processes and behavior," through spatial behavior. Cognition is placed in another domain. Their research findings reveal cultural differences in the nonverbal and verbal ways in which people communicate. The present project posits that privacy is also regulated through the cognitive means of environmental screening; this is examined in the following chapter. Spatial behavior refers to the output manifested in a person's actions and responses (Lang, 1974). It encompasses the ways that people use the environment in the course of social interaction. How we perceive behavior depends upon the conceptual framework of one's own culture. Lee (1959) summarizes:

> When I throw a ball, do I perform an aggressive causal act, as my culture predisposes me to believe? Or does the ball leave my hand, as the Greenland Eskimo puts it, or do I merely actualize the ball's potential to move, as the Navajo would have it? (p. 2)

A "layered" cultural analysis is provided in Figure 3, which displays the cultural and physical environmental elements that interrelate with all three cultural domains in networks and patterns of dependencies. These elements are examined on a different level of analysis. The present project posits that they evolve as a subsystem, influenced simultaneously by the three major cultural domains. Patterns of language, as ways of communicating, are culturally patterned through formal and informal education (Heath, 1983). Patterns of language are shaped by social legacy, adaptation to other groups, and psychological processes. Anthropologists have been intrigued for a long time by the parallels and possible relationship between the structure of language and the structure of cognitive thought, evidenced in the early major research of Sapir and Whorf. Structural linguists such as Levi-Strauss consider language as patterns for behavior, out of which other cultural domains evolve. Although the writings of Levi-Strauss, cited by Kaplan and Manns (1972), primarily emphasize language patterns, they demonstrate the interconnectedness of language patterns with cultural domains:

> Language can be said to be a condition of culture, and this in two different ways: First, it is a condition of culture in a diachronic way, because it is mostly through the language that we learn about our own culture [through informal and formal education].... But also, from a much more theoretical

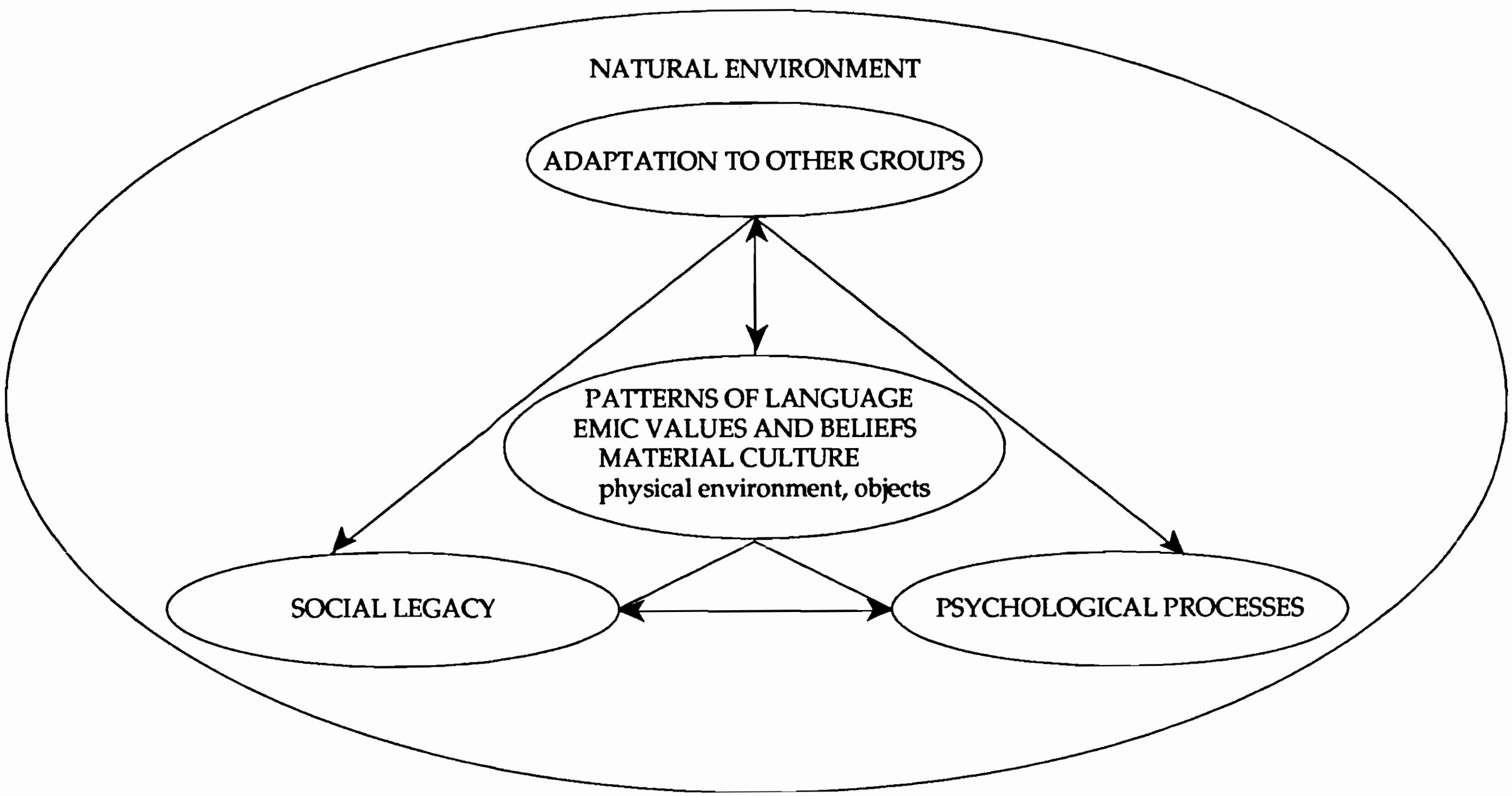

Figure 3 Cultural and Physical Environmental Elements within the Model of Culture and Environmental Relations

> point of view, language can be said to be a condition of culture because the material out of which language is built is the same material out of which the whole culture is built: logical relations, oppositions, correlations, and the like. (p. 163)

Emic values and beliefs represent core elements that are fundamental to culture and are resistant to change (Rapoport, 1978a). They are resistant to change not only because they are so personally experienced, but because "people cannot act or interact at all in any meaningful way except through the medium of culture" (Hall, 1969, p.188). A key component of culture is that people share common views of the world through their emic values and beliefs. This does not mean that they agree in all respects, but only that they share a common core of consensus (Goodenough, 1961; Rapoport, 1978a). Material culture, an environmental outcome, is a reification of culture that is also shaped by the cultural domains. Material culture appears in the transformed physical environment and in objects. The physical environment represents a major resource of material culture. Particular attention is given to this component of material culture, reflecting the research emphasis of the present project.

Environmental Relations: the Physical Environment

The transformed physical environment, or built environment, includes buildings, their interiors, and the surrounding outdoor areas. Sundstrom (1985) describes the physical environment as the "layout and appearance of buildings, the arrangement and properties of rooms, characteristics of equipment and furniture, and the associated ambient conditions (sound, light, temperature, air)" (p.174). Zeisel (1984) categorizes these attributes of the physical environment as "field characteristics" and "barriers." He asserts that field characteristics alter the physical context through shape, orientation, size, and environmental conditions. Zeisel further asserts that barriers keep people apart or join them together, physically and symbolically, through walls, screens, objects, and symbols. These enviromental mechanisms provide resources for facilitating and impeding privacy regulation and are examined in the following chapter.

Sundstrom (1985) extends Duffy's (1974a,b) general hypothesis that properties of the physical environment communicate dimensions of organizational (e.g., institutional) structure. Sundstrom proposes a more specific hypothesis, theorizing that properties of the physical environment communicate eight specific dimensions of organizational structure. For instance, standardization of procedures and specification of tasks parallel rigidity of layout within buildings and subdivisions; formalization of roles (including role-specification and emphasis on status and formal channels) parallels differentiation by rank of workspaces and uniformity of workspaces within ranks; interdependence (among work units and tasks, including work-flow) parallels proximity of work-units adjacent in the work flow; and so forth.

Functions of the Physical Environment

Lang (1974) proposes that the physical environment functions in three ways: it helps to maintain the physiological states necessary to sustain life; it provides the necessary behavior settings; and it supports the psychological states through the use of symbols.

Rapoport (1982) offers additional insight, proposing that the physical environment also provides cues for behavior; guides enculturation (and acculturation for that matter); and can help to maintain self-identity. Enculturation is defined as the cultural codes (emic values and beliefs) learned early in life. Acculturation is defined as the cultural codes learned later in life through rapid cultural contact and/or rapid change (see Rapoport, 1982; also Woods, 1975).

Perception of the Environment

Contributions to the understanding of environmental perception increased rapidily during the 1970's. Representative overviews are provided by Downs and Stea, 1973; Ittelson, 1973; Lang, 1974; Lowenthal, 1972; and Proshansky, et al., 1970; 1976.

As early as 1950, Gibson argued that a detailed examination of the environment is necessary in order to understand perception. Gibson described the environmental dynamism of perception as a complete system. The environment, according to Gibson, contains information consisting of environmental stimuli that constitute basic, structural categories of perceptual experience. Ittelson (1973) describes Gibson's structural categories as a hierarchy of meaning levels, ranging from symbolic meaning (e.g., the ground to homeland); to activity-oriented meaning (e.g., the ground is something to be walked on); to concrete meaning (e.g., the ground itself). The environment is perceived not only in terms of stimuli, but in the structure of that stimuli.

Congruently, Ventre (1986a) describes the environment as the "configuration of perceptual qualities in space and time." Garling (1976) expands the concept to include a cognitive aspect. He describes environmental perception as the classification and coding of the physical environment, acknowledging a perceptual/cognitive structure. This structure facilitates and impedes privacy regulation through stimulus screening. Mehrabian's (1976) theory of stimulus screening and its relationship to privacy regulation are discussed in the following chapter.

Ittelson (1973) summarizes enduring qualities of actual and perceived environments:

(1) Environments surround.

(2) Environments are multi-modal, offering information through many senses.

(3) Peripheral as well as central information is always present in environments.

(4) Environments provide more information than can be processed.

(5) Environmental perception involves action, it cannot be passively observed.

(6) Environments provide symbolic meanings and motivational messages.

(7) Environments have an ambiance (e.g., atmosphere) mediated through such things as social activity and aesthetic quality.

Perception of the environment also encompasses perceived adaptation and perceived user control. Individuals change "adaptation-levels" with continued exposure by adjusting their psychological standard of reference (Helson, 1964; Sundstrom, 1985). By so doing, they readjust perceived quality of life (QL) and quality of work life (QWL) standards. Sundstrom (1985) illustrates adaptation to the invasion of acoustical privacy:

> For instance, an office worker may find an office noisy at first but after awhile his standard of reference may change as he comes to regard the office as less noisy. (p. 179)

Additionally, the office worker may welcome the benefit of "masking noise" to keep his/her conversations private--a "learned" response to environments.

Wineman (1986) urges organizations to create work environments that allow for individual choice and control, environmental diversity, and worker participation. In perspective, Westin (1967) theorizes that the need for autonomy, or power to control and regulate one's life, is one of the psychological functions of privacy. (This includes both perceived and actual control.) Davis and Altman (1976) observe that perceived control and sense of responsibility for the physical environment are lowest in workplaces used by the greatest numbers of people. This has ramifications in open-plan workplaces where privacy is limited. That is, the degree of perceived lack of control over the environment can evoke stress (Frankenhaeuser and Gardell, 1976). Baum, et al. (1981) examine perceived control over environmental stressors. Baum, et al. (p.7), citing Wolf and Goodell (1968), argue that people not only respond to dangers or threats that have materialized; they are "equally affected by expectations of these events and by symbols of danger experienced previously."

Environmental Meaning

The physical environment is a communication medium (Becker, 1977,1981; Steele, 1973). Weaver (1986, p. 52) defines communication as the "creation of common meaning." People interact with the silent messages communicated by the physical environment:

> Nothing occurs, real or imagined, without a spatial context, because space (along with time) is one of the principle organizing systems for living organisms. (Hall, 1971, p. 24)

The physical environment communicates meaning. But, to reiterate, environments are not predetermining. They may be facilitating to the extent of acting as a catalyst for releasing latent behavior, but they cannot generate activities (Gans, 1968). Environmental determinism, now discredited, encouraged major misunderstandings such as the socio-environmental tragedies of Pruit-Igoe and "urban renewal" in Boston's Italian West End during the 1950's. The physical environment may facilitate, inhibit, or be neutral as a communication tool.

The environment is a nonverbal form of communication. Perception and structure of environmental stimuli are mediated through the symbolic interpretation of mnemonic cues. Meaning is imposed on the environment through mnemonic cues that are encoded into the built environment. Mnemonic cues reflect cultural practices, roles, rules, and mores. These cues are interpreted by the user (Rapoport, 1976). If the code is not decoded by the user, it is not shared nor understood, and the environment fails to communicate. It is for this reason that Rapoport (1983) argues that built environments should be culturally specific in order for cues to be understood.

Cultural Appropriateness

Cultural appropriateness is used broadly here to refer to the compatibility of an introduced element with the socio-cultural patterns, goals, values, and circumstances [situational context] characteristic of the populations to which the element is introduced (Harding, 1979).

Culture shares a common code of communication. In order for the environment to communicate it must have meaning. Singer (1984) argues that cultural differences are due to different meanings that people assign to the environment. Rapoport (1983), examining built environments in developing countries, observes that users frequently reject "copied" designs. He points out that imitating physical elements of design for new construction does not work; not only because the wrong physical elements are copied, but because they communicate inappropriate (e.g., incompatible) meanings:

> In copying, designers usually tend to copy the 'hardware'. Imitation leads to inappropriate results because it typically involves superficial appearance--the shape, geometry and the like rather than the principlies and schemata behind the physical expression, the domains of which it consists, the spatial organization and its relation to lifestyle, social structure, and so on. (p. 251)

The globilization of what were once national industries or firms has brought a crisis in corporate communication. People are dealing with other cultures continually. Yet culturally inappropriate structures continue to be built worldwide, especially in developing countries (see Rapoport 1978a,b,c; 1983). Built environments that are not culture-specific lack compatibility in environmental meaning and can be perceived as disorienting and potentially stressful (Rapoport, 1983).

Cultural Context

Hall (1983) examines contexting patterns of culture, theorizing that information, context, and meaning are bound together in a balanced, functional relationship. Hall proposes that cultures enculturate their members to pay attention to different aspects of the environment with varying degrees of significance. He coins the term "contexting" to describe the perceptual and cognitive process of recognizing, giving significance to, and incorporating contextual cues in order to interpret the meaning of the behavior setting. Contextual cues refer to implicit and explicit messages that transmit information about the nature of the interpersonal relationship between communicators, nonverbal expressions, the physical environment, social circumstances, and verbal communication that explicitly stands out against the background of implicit messages. More explicit information has to be transmitted in order to communicate when the context of the situation is not understood.

Hall applies the concept of contexting to the cross-cultural comparison of communication patterns. He theorizes that cultures with low contexting patterns rely more on environmental mechanisms to screen for privacy.

These cultures also require the majority of information to be transmitted in explicit codes in order to understand meaning in environments. Cultures with high contexting patterns rely more on behavioral mechanisms to screen for privacy; most of the information transmitted is internalized in the individual or implicitly coded in the behavior setting. Hall (1966, 1983) organizes cultures on a continuum of high to low in their contexting patterns: Japanese, Chinese, French, and Mediterranean cultures are placed at the higher end of the continuum; American, Canadian, English, German, and Swiss cultures are placed at the lower end of the continuum.

CONCLUSION

The present project asserts that privacy regulation in work environments operates within the overall context of culture and is mediated by three cultural domains: psychological processes; social legacy; and adaptation to other groups. Behavioral mechanisms regulate privacy through psychological processes. Social mechanisms regulate privacy through institutional policies and social norms patterned after social legacy and adaptation to other groups. (Adaptation of work groups to accepted social practices, rules, and roles in a behavior setting is patterned by how groups relate, adapting to different positions.)

Privacy is further mediated by the subsystem of cultural and environmental elements: emic values and beliefs; patterns of language; and material culture, in particular the transformed physical environment. These elements evolve from and are simultaneously influenced by all three cultural domains. Emic values and beliefs constitute the common core of consensus that a culture shares to communicate "meaning." Cultural contexting patterns that communicate contextual cues for privacy regulation are predicated upon emic values and beliefs. Patterns of language, as ways of communicating, condition verbal/nonverbal behavior for privacy regulation through formal and informal education.

People interact with the silent messages communicated by the transformed physical environment, a major resource of material culture. The physical environment communicates the cultural meaning of environmental mechanisms as privacy regulators through mnemonic cues encoded into the environment. These cues are interpreted by the user. If the code is not decoded, it is not shared nor understood and environmental mechanisms, employed to regulate privacy, fail to communicate.

Privacy regulation operates in networks and patterns of dependencies--just as the cultural domains do. It is not a unidimensional concept with an easily identifiable class of empirical referents in current literature. This contributes to the complexity of privacy as a concept and to its regulation. The following chapter explores this complexity on another level of analysis, examining theoretical notions and ideas, and proposes a conceptual framework for privacy regulation.

CHAPTER III

CONCEPTUAL FRAMEWORK FOR THE STUDY OF PRIVACY IN THE WORKPLACE: TOWARD A HOLISTIC MODEL OF PRIVACY REGULATION

The majority of research on privacy and privacy regulation in work environments concentrates on office settings, in particular the "open-plan." Empirical studies of privacy regulation are minimal to nonexistant in other work environments where privacy is limited. A wide range of work environments--from customer service banking areas and hotel lobbies to extremely specialized work environments, including space stations, underwater habitat laboratories, Antarctic research laboratories, and submarines--are undocumented. Even the minimal research that exists on privacy in specialized environments is only partially documented, further contributing to the lack of empirical data outside the office setting. Partial information on privacy is typically extrapolated from existing habitability studies of groups living and working in isolated conditions. (See Harrison, Sommer, Struthers, et al., 1986; Harrison, Caldwell, and Struthers, 1988; and Stuster, 1984 for an examination of specialized environments.)

Current theorizing on privacy and privacy regulation in the work environment is in its formulative stage. Empirical research examining privacy issues in the open-plan office setting offers scientific documentation that may apply to other work environments, providing a knowledge base for future research endeavors across a wide range of work environments.

THE IMPACT OF WORK ENVIRONMENTS ON PRIVACY:
THE EVOLUTION OF THE OPEN-PLAN

The introduction of airconditioning in Europe allowed office landscaping, and later the open-plan, to become a practical choice for designers and office managers. Today's open-plan office evolved from the German burolandschaft, loosely translated into English as "office landscaping." It was initiated by the Quickborner Team during the 1950's (Ellis and Duffy, 1980).

Office landscaping was marketed as a management consultancy package in Germany, spreading to the United Kingdom and Scandinavia, and finally to the United States during the 1960's. The Quickborner Team of Hamburg, an office management consultant firm, proposed that office planning should be based on patterns of communication and workflow (e.g., paperflow). Other values, such as appearance, status recognition, and tradition, should either be ignored or given minor attention. In its purest application, the design differed from conventional cellular layouts in that it contained no private offices, few floor-to-ceiling partitions, minimal storage, absence of strict regimentation in layout, use of plants, and use of white noise to mask unwanted sounds (Brandt, 1987; Ellis and Duffy, 1980; Friedman, et al., 1976; and Pile, 1976).

Office landscaping was promoted on the basis that the removal of internal walls allowed for greater communication among co-workers. This, in turn, was supposed to positively affect work output; eliminate status demarcation, which would result in improved personal relations among co-workers; increase feelings of equality and team spirit, and result in higher productivity. The layout provided greater flexibility and appeared to offer economic advantages in reduced original facility construction maintenance costs (Ellis and Duffy, 1980).

Office landscaping evolved into what is commonly referred to as the open-plan office, due to the development of systems furniture. This was introduced by the furniture manufacturers Herman Miller and Knoll during the 1960's. The open-plan office is primarily characterized by interlocking partitions of varying heights (typically three, five, six, up to nine feet high) that provide partly enclosed workspaces, additional storage, recognition of corporate image (projected through aesthetic appearance), and less unassigned circulation space than the earlier office landscaping. It was believed that the open-style offered workers efficient communication, a greater sense of one's own space, and a degree of privacy previously lacking in office landscaping (Brandt, 1987; Ellis and Duffy, 1980).

The Impact of the Open-plan on Privacy, and Misconceptions

Assumptions regarding the contributions of office landscaping were carried over into the open-plan design; some proved erroneous. These expectations are indicative of the continued problems with privacy in these work environments. Justa and Golan (1977) point out that it was erroneously assumed that privacy could be created exclusively through the manipulation of physical design elements, for both the conventional cellular layout and the open-plan. Their research findings contradict this, by revealing that office norms facilitate and impede privacy regulation through social and policy supports, in addition to elements of physical design.

Additionally, privacy in the open-plan was expected to be achieved to the same degree as conventional private offices through a subjective sense of space boundaries mediated by physical elements, such as plants and medium height partitions (Alseleben, 1965). The research of Sundstrom, Town, and Brown, et al. (1982) refutes this: People gain their greatest perceived privacy in individual offices enclosed by floor-to-ceiling walls or partitions and accompanied by doors. Empirical research consistently indicates that workers experience diminished visual and acoustical privacy, and an increase in noise and interruptions, after moving to an open-plan from a conventional style. Results have generally revealed improvement in some types of communication, such as interdepartmental contact and supervision. A decrease in other types of communication is also noted, however, in particular confidential conversation or speech privacy. (See the review by Sundstrom, Herbert, and Brown, 1982.)

Brandt (1987), investigating the open-plan design in work organizations, summarizes corporate experiences. The Marriott Corporation reported that employees continually complain about lack of privacy and status demarcation through the absence of private offices:

> At Marriott, hierarchy is a continuous issue. We find the greatest conflict is right at the boundary point where open-plan stops and closed offices start. (p.13)

Allied Bancshares, Inc. discovered that customers, in addition to employees, complain about a lack of privacy:

> We used open-plan at Allied Bancshares in the customer banking areas...and found that even if there wasn't sound transmission between work stations, customers perceived a lack of privacy. It didn't help that a conference room was nearby, customers wanted to speak to someone 'in charge' whose office had four walls and a door. (p. 13)

Acoustical problems continue to be confront corporations. Eli Lilly and Company noted:

> Each space must be designed according to its use. Some spaces can be designed to be quiet--particularly upper echelon offices. There, if a secretary types, the sound will often reverberate throughout the floor. (p. 13)

The popular reliance on a building's mechanical system to create white noise is not necessarily a satisfactory solution. JMB Realty Corporation observed:

> Employees notice when the white noise is shut off in the evening and it's perceived as a relief. (p. 13)

Representatives from corporate culture in Brandt's investigation indicated that economic advantages in reduced original construction costs may be more marginal than originally anticipated. Cost payback must be examined when considering the benefits of open-plan designs. Construction cost (pre-tax) of the space per square foot increases due to the furniture and equipment cost (systems furniture in particular). The cost consequences are heavily influenced by tax policy that depreciates furnishings and equipment at a much steeper rate than the fixed structure. The costs of reconfiguring layouts in future years must also be factored in (Ventre, 1986b).

Marriott Corporation complained about the cost of systems furniture in leased facilities:

> Systems furniture works fine in our corporate headquarters where we have electrical raceways in the floor and five-by-five grids in the ceiling. But now we're going into a fair amount of leased space to accommodate short-term expansion goals and most of this space is not set up for systems. What we end up with are panels with overcomplicated electrical requirements that are very costly. It takes alot of churn in office space to recover the cost. (pp.14;16)

Congruent with this line of thinking, a facilities manager from Salomon Brothers noted:

> I recently worked for a company that laid out two floors--one with all open plan and the other with 75 percent enclosed and 25 percent open. We found that it was no more space efficient to go to open plan. [Space efficiency is defined here as cost per square foot and furniture and equipment cost.] Therefore, the company chose the hierarchical designation of the enclosed offices. (p. 18)

Brandt concludes that one of the most sensitive problems with the open-plan for corporations is the assignment of private offices versus open-plan workspaces. He argues that the private office is an effective status symbol and is an important goal for many office workers (especially management level), despite the context of new technologies and "state-of-the art" offices. <u>Research indicates that this is one of the symbolic values of privacy</u>. (See Konar, et al., 1982; and Steele, 1973.)

Further misunderstanding about privacy in the open-plan is evident in the typical assignment of private offices to higher management levels by corporate culture. More is at stake here than reinforcing organizational hierarchy through status demarcation. Privacy needs may <u>not</u> depend upon job complexity--a general misconception. Workers are typically assigned to open workspaces based on this erroneous assumption, in addition to a reflection about status. Empirical studies by Sundstrom, Town, Brown, et al. (1982) reveal that privacy needs are not positively related to job complexity. The researchers theorize that <u>different jobs create different privacy needs</u>. In other words, perceived privacy needs may differ across job types and cannot be ranked on a high to low continuum based on job complexity.

This chapter examines current theory on privacy and its regulation in the work environment, in order to refine privacy as an intellectual construct and to shed light on misunderstandings. Misconceptions about privacy by corporate culture are compounded by conceptual and methodological conflicts inherent in interdisciplinary research. Wineman (1986) argues that progress toward integrative theory-building in work environments continues to be limited due to the various disciplinary perspectives examining psychological, physiological, and architectural elements. This lack of integration is evident in privacy research. Conceptual frameworks for privacy regulation are not balanced. They are paradigm-specific from particular schools of thought. Regulatory mechanisms outside parent disciplines are vaguely represented.

A holistic model of privacy regulation is presented in this chapter which attempts to integrate theory and further refine privacy regulation, conceptually and operationally. The model proposes a balanced conceptual framework for privacy regulation and suggests a more detailed method for classifying mechanisms based on their regulatory characteristics.

CONCEPTUAL FRAMEWORK FOR PRIVACY

The complexity of privacy as a concept is evident in the lack of agreement by theorists on exactly what privacy is: Is it a psychological state? A behavior? A goal? An attitude? The confusion and disagreement over privacy as a concept reaches global proportions. The first international comprehensive study of privacy was conducted by the International Commission of Jurists, held in Stockhom, 1967

(Mellors, 1978). The Commission could not agree upon a universal definition for privacy--only that it means different things to different societies at different times.

Privacy Defined

Privacy derives from the Latin words "privatus" (e.g., withdrawn from public life) and "privare" (e.g., to deprive). It acquired conventional opposition to public life during the sixteenth century and was considered to be a privilege, not a deprivation (Williams, 1983).

Behavioral and social scientists have advanced several definitions for privacy (see the reviews by Altman, 1976, 1977; Altman and Chemers, 1980; Margulis, 1977; and Pennock and Chapman, 1971). Concepts of privacy have emphasized one of three central themes: retreat from people; control over information; or regulation of interaction. Privacy within the work environment involves all three themes, but typically refers to the regulation of interaction or communication (Sundstrom, 1986).

1. **Retreat from People**

Early definitions of privacy reflect Bates' 1964 definition as a "person's feeling that others should be excluded from something which is of concern to him, and also a recognition that others have a right to do this" (p. 429). Deliberate withdrawal by an individual or group from contact with other people is emphasized here, with the central theme being retreat from people. Privacy, under this definition, represents a situation in which the person achieves solitude. (This should not be confused with isolation, resulting from a perceived lack of environmental stimuli and/or other people.) Bates, drawing on the research of sociologist Goffman, argues that the regulation of self/other boundaries is necessary in order to establish self-identity, which services self-esteem. Goffman (1969) examines overt role behaviors and the self as a monitoring system. He theorizes that the "front" and "back" regions of behavior are analogous to being "on-stage" and "off-stage." On-stage reflects overt role behaviors that people present to the world, and off-stage reflects the vulnerable side of the self when no social roles are consciously being played.

Comments

Bates' definition emphasizes <u>avoidance</u> of interaction with other people. This does not account for the dialectic nature of social exchange (see Simmel, 1950 translation by Wolff). Environmental stimuli are also not accounted for in the definition. Bates does not acknowledge that interaction and avoidance also occur between people and environmental stimuli. Hall (1966) explains that everything a person is and does is associated with his/her experience of space. A person's sense of space is a synthesis of many sensory inputs. Sensory inputs are stimulated by attributes of the physical environment as mediated by culturally-conditioned perceptual faculties (Broadbent, 1973). These attributes, as environmental mechanisms, facilitate and impede privacy regulation.

2. **Control over Information**

A widely accepted definition of privacy, first advanced by Westin (1967), is the "right of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about themselves will be communicated to others" (p.7), with the central theme being control over information.

Westin, who is frequently cited in discussions of electronic communications and documentary information whether generated in business or government, draws upon the research of Goffman and German sociologist, Simmel. Simmel (translation by Wolff, 1950) argued in the early 1900's that a person needs to be a part of other peoples' lives and also needs to establish his/her own distinctness in order to maintain self-identity. He described the dialectic nature of social exchange and proposed that privacy is an optimizing process.

Westin describes four states of privacy:

(a) Solitude--freedom from observation by others.

(b) Intimacy--involving pairs of people rather than one person.

(c) Anonymity--avoidance of identification in public places.

(d) Reserve--concealment of information about oneself to others.

Westin identifies four psychological functions of privacy:

(a) The need for autonomy--the power to control and regulate one's life.

(b) The need for emotional release--to be able to relax from social roles "off-stage," thus protecting the vulnerable aspects of behavior.

(c) The need for self-evaluation--to be able to experiment with various social roles "off-stage."

(d) The need to allow for limited and protected communication with others--to be able to secure confidential communication with others.

Comments

Westin defines the right to privacy, but not privacy. Privacy is, for Westin, basically a descriptive word, whereas the notion of claim presupposes that the problems of description have been resolved (Velecky, 1978). In order to make a claim, the grounds of that claim first need to be identified. Westin addresses the right to privacy in normative value terms, reflecting his background as a political scientist. Westin's emphasis on the right to privacy can be seen in the historical development of privacy within American law. Judge Cooley first defined privacy in 1888 as the right to be let alone (cited in Mellors, 1978). Lawyers Warren and Brandeis (1890-1891), using Cooley's definition, set a law precedent by defining privacy at length in legal terms for the first time in the Harvard Law Review. They treated the right to privacy as a branch of law of libel dealing with truthful statements made for improper purposes. Their concern was with freedom from embarassing publicity.

Economist Young (1978) argues that increased interest in the right to privacy has been triggered by the bombardment of information technology, especially computers; population increase; increased government intervention; and changing moral and social attitudes.

This increased interest is reflected in The Electronic Communications Privacy Act, enacted during the Reagan Administration, which places for the first time strict limits on government and other intrusions into individual privacy by technological means (Sitomer, 1986). Sitomer points out that strong advocates of privacy such as the American Civil Liberties Union continue to lobby for new laws and restrictions on computer matching, and sharing computer files containing personal data, such as credit or health information. Sitomer concludes that an increasing number of questions relating to privacy invasion is being raised about the use of computers to monitor the efficiency and productivity of workers.

Interest in the legal right to privacy extends beyond U.S. boundaries. Article 12 of the Universal Declaration of Human Rights, Article 17 of the United Nations Covenant on Civil and Political Rights, and Article 8 of the European Convention for the Protection of Human Rights and Fundamental Freedoms, all specify that there is a universal, human right to privacy (Mellors, 1978). This right may be universally accepted, but its specific application is largely culture-bound.

3. **Regulation of Interaction**

A third definition of privacy, first advanced by Altman (1975), is the most comprehensive, encompassing the definitions of Bates and Westin. It is the "selective control of access to self or one's group" (p.18), with the central theme being the regulation of interaction. Altman, like Westin, draws upon the work of both Goffman and Simmel. Altman describes privacy as a boundary-regulating process that is dialectic in nature (i.e., open/closed; accessible/ nonaccessible). Privacy is, for Altman, an interpersonal process whose object is optimization.

Altman argues that the four psychological functions theorized by Westin are all in the service of the main psychological function of privacy: to maintain self-identity. Regulating self/other boundaries helps to maintain self-identity. Poor boundary definitions, according to Altman, can lead to mental problems. Blatt and Wild (1976) propose that mental problems, such as schizophrenia are due to poor boundary definition. Patients with this condition are unable to separate themselves from others and see themselves as always being part of the world--never establishing their own distinctness.

Perceived Privacy Needs

Altman theorizes that the most basic privacy need is to optimize social contact and to avoid crowding in order to maintain self-identity. Too much interaction leads to crowding. Crowding is subjective; the same number of people in the same size area is perceived differently depending upon the cultural context. Cultural context is mediated through a set of mnemonic cues that indicate what kind of setting it is (Rapoport, 1976). The psychological literature on the effects of crowding in face-to-face situations regarding stress, tension, discomfort, social interaction, and performance is voluminous. Altman (1975) and Baum and Epstein (1978) have summarized this research.

Kaplan (1977) stresses the importance of privacy needs by utilizing Maslow's 1943 Hierarchy of Needs. Kaplan postulates that privacy falls under "safety and security," the second basic need after "physiological needs." Sundstrom, Town, and Brown, et al. (1982) propose that there is a hierarchy of privacy needs in the work environment, depending upon job type. Their findings do not support the original hypothesis that job complexity is positively related to perceived privacy needs. Rather, different job tasks may create different privacy needs. For instance, in one of their studies, clerical workers in walled offices reported less privacy than managers did in offices with equivalent enclosure. The researchers theorize that at the most basic level, control over social contact and the ability to avoid crowding take priority. This corroborates Altman's assertion. Clerical job types are designated at this level. Once these needs are satisfied, the ability to concentrate by controlling distractions and interruptions take priority at the second level. Technical help, such as bookkeepers and accountants, are designated at this level. Once these needs are satisfied, autonomy over supervision and audibility to co-workers take priority at the third level.

This hierarchy of privacy needs is in the service of maintaining self-identity, as theorized by Altman. Sundstrom, et al., (1980) caution that sole concentration on creating an optimal level of social contact may be at the expense of under-emphasizing the link of privacy with identity.

Privacy Regulation

Altman was the first to theorize that privacy is a cultural universal (1975). Altman's cross-cultural research of privacy regulation in developing countries reveals that what differs is not that the need for privacy exists, but the ways in which that need is met, the ways privacy is regulated. The cultural variability of standards indicates that such variability exists in the work environment of developed countries as well, though no cross-cultural studies have empirically examined privacy regulation in this setting (Belcher, 1985; Rapoport and Watson, 1967-1968).

Altman provides a conceptual framework of privacy regulating mechanisms used to withdraw from interaction or to seek it out. These are environmental behavior (territoriality and personal space), verbal and nonverbal behavior, and cultural practices. They operate in different combinations as a social system. Altman considers environmental mechanisms to be another regulator, but does not include them in the conceptual framework. His primary interest in behavioral mechanisms reflects his background as a social psychologist. A graphic representation of Altman's privacy regulating mechanisms is presented in Figure 4.

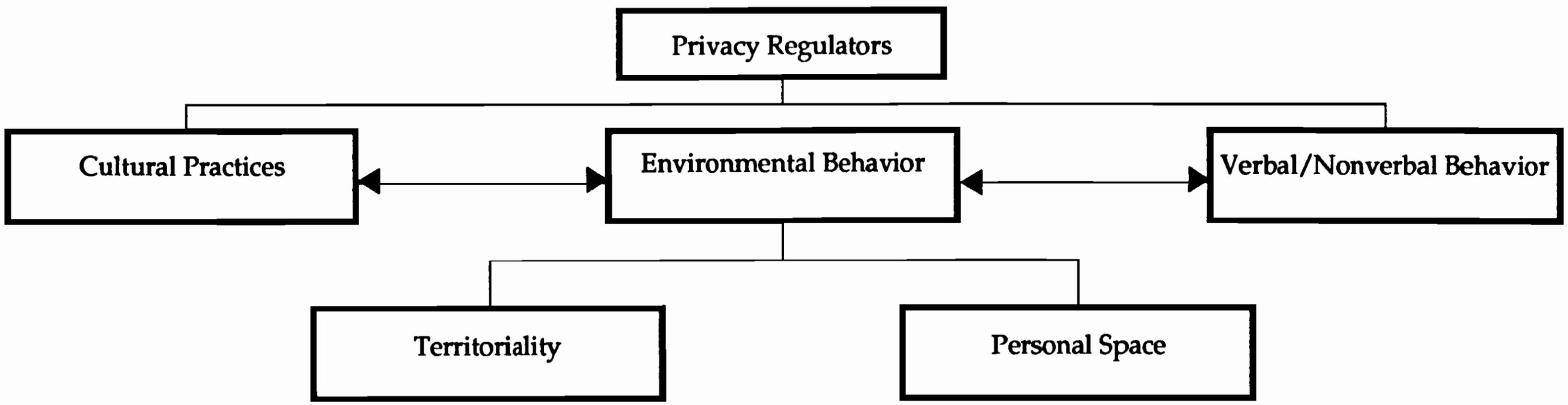

Figure 4 Privacy Regulating Mechanisms identified by Altman

Comments

Altman's theoretical framework is the most applicable to the investigation of privacy regulation in the work environment (Sundstrom, 1986). The present project expands Altman's framework of privacy and its regulation to include environmental stimuli in the definition of privacy and additional regulatory mechanisms. The model, illustrated in Figure 1 and presented in the "Introduction," conceptualizes a more holistic framework of privacy regulation than previously provided. It draws upon the research of Altman (1975, 1976, 1977); Altman and Chemers (1980); Hall (1966); Justa and Golan (1977); Rapoport (1976); Sundstrom (1982, 1985, 1986); Sundstrom, et al., (1980); Sundstrom, Herbert, and Brown (1982); Sundstrom, Town, and Brown, et al. (1982); and Zeisel (1984).

Sundstrom (1986) describes privacy as a "psychological state that accompanies a satisfactory retreat from, or regulation of, social interaction" (p. 177). Regulation between the self and others and/or environmental stimuli is implicitly recognized. The present project defines privacy as a <u>psychological state associated with the regulation of interaction between the self and others and/or environmental stimuli</u>. This definition draws upon the research of Altman (1975, 1976, 1977), Altman and Chemers (1980), and Sundstrom (1986).

<u>TOWARD A HOLISTIC MODEL OF PRIVACY REGULATION</u>

Bates, Westin, and Altman consider the experience of privacy being channeled through culture. Hall (1966) asserts that privacy is regulated through the structuring of space as a culturally patterned dimension. It is outside cultural awareness. The theoretical framework for the present project holds that social, behavioral, and environmental mechanisms operating within the context of culture are employed to regulate privacy within work environments. They operate in different combinations and are interrelated.

Environmental Mechanisms

The physical environment provides resources for regulating interpersonal accessibility, and for signalling desires for more or less social interaction (Sundstrom, 1985). Environmental Mechanisms are the physical elements devised or deployed by designers and/or which enable users themselves to regulate privacy through their own locales. The physical elements are composed of field characteristics and barriers (Zeisel, 1984). Zeisel asserts that field characteristics perceptually alter the physical context through shape, orientation, size, and environmental conditions. He further asserts that barriers are physical elements that keep people apart or join them together, physically and symbolically, through walls, screens, objects, and symbols. Field characteristics evolve from the layout of barriers.

An in-depth examination of environmental mechanisms is provided in this section, reflecting the research emphasis of the present project. As stated earlier, Hall (1966) explains that everything a person is and does is associated with his/her experience of space. A person's sense of space is a synthesis of many sensory inputs. Sensory inputs are stimulated by attributes of the physical environment (Broadbent, 1973). Kilpatrick (1961)--echoing the eighteenth century empiricism of Berkeley, Locke and Hume--summarizes this: "We can never be aware of the world as such, but only of...the importance of physical forces on the sensory receptors" (p. 1). This statement pinpoints the importance of environmental mechanisms in constructing the different perceptual worlds that people inhabit within their culture.

Field Characteristics

Zeisel proposes that field characteristics of a place can alter people's ability to be together or apart. They do this by altering the physical context within which perceptual relationships occur. Zeisel describes field characteristics as shape, orientation, size, and environmental conditions:

> The shape of a setting affects primarily visual and perceptual relationships.... Corners in a square area, for example, can be more easily seen as separate from one another than parts of a round place can. In a study of children playing in different rooms, groups of children quickly claimed as distinct territories the places in the leaves of clover-shaped rooms (Hutt, 1969). Orientation of one place to another influences the behavioral relationship between people in them. Two places oriented so that people using them have a higher chance of casually seeing or meeting one another may be considered "functionally" closer than two equidistant places oriented to minimize chance encounters.... (Festinger, et al., 1950) Possible distance between people is a major determinant of potential behavior relationships. The size of a setting offers opportunities for people to put distance between themselves or limits their options. A 4-meter -square conference room does not offer any of seven participants at a meeting the option to separate from the rest of the group.... Loudness, light intensity, and air flow are environmental conditions that directly affect possibilities for behavior relationships by limiting and augmenting people's ability to hear, see, smell other people and activities. (pp. 134-136)

Loudness facilitates and impedes privacy regulation through background noise and conversational privacy. It is typically referred to as acoustical privacy (Sundstrom, 1982). Extensive research has been conducted on acoustical privacy, beginning with the early research of Boyce, 1974; Brookes, 1972; Brookes and Kaplan, 1972; Hundert and Greenfield, 1969; Ives and Ferdinand, 1974; McCarrey, Peterson, et al., 1974; Nemecek and Grandjean, 1973; Riland and Falk, 1972; and Zeitlin, 1969. This research reveals that workers in open-plan offices, compared to conventional offices, generally report experiencing less privacy. They spend additional time conversing, hear more noise, and experience more distractions. The intrusion of noise is emphasized in these studies. Conversely, loudness can also facilitate privacy regulation. This is evidenced in white noise introduced in open-plan offices, acoustically engineered through electronic sound masking systems (Herbert, 1984).

Goodrich (1982) gives an example of how light intensity relates to privacy regulation within the work environment. Task/ambient systems that provide higher light levels on the primary work surface, but reduce overall ambient light levels, create an unevenly lit space surrounding the workspace. Based on interviews with office workers from ARCO and Senate offices, Goodrich concludes:

> This quality seems to increase informality, to reduce status distinctions, and to create a more relaxed climate, all of which increase their sense of perceived privacy. (p.365)

Light intensity facilitates and impedes visual privacy. Sundstrom (1982) explains that visual privacy generally refers to the "ability to work without unwanted surveillance and sometimes includes isolation from visual distraction, such as the sight of other people working or passing by" (p. 383). The visual sensory system is the most powerful of all the sensory means of perceiving qualitites and dimensions of the environment. Psychologists estimate that, for adults, as much as ninety percent of all sensory information is visually perceived data (Fitch, 1972).

Kleeman (1981) gives an example of the olfactory relationship between privacy regulation and the quality of air flow within the work environment:

> Some people are very conscious of another kind of privacy--olfactory privacy. Some individuals are allergic to tobacco smoke or maybe they do not like the body odors of the workers nearest to them. (p. 284)

Empirical studies of olfactory privacy in work environments are minimal to nonexistant. Recent research, however, conducted in Europe indicates that olfactory context may have a mediating influence on perceptions of visual and acoustical privacy (Davis, 1990). That is, olfactory context appears to cause stimuli, such as visual and auditory, to be experienced and responded to differently. Ittelson's (1973) theory of environmental perception, as stated earlier, supports the "structuring" of environmental stimuli. He theorizes that the environment is perceived not only in terms of stimuli, but in the structure of that stimuli. (See also Garling, 1976; Mehrabian, 1976.) Caution is advised in generalizing from the European findings at the present time, as the structuring of environmental stimuli may not be equally salient across cultures.

The research of Sundstrom, et al. (1980) indicates a positive relationship between privacy and job satisfaction. Congruent with this line of thinking, the Japanese Kajima Corporation has open a building in Tokyo utilizing "piped-in aromas" to increase productivity and creativity of its employees (cited in "Japanese Company Hopes Idea Makes Good Scents," 1989). Perhaps taken to an extreme, this emphasis on quality of air flow does acknowledge the multidimensional sensual reality of environmental conditions as privacy regulators.

Barriers

Zeisel (1984) describes barriers as walls, screens, objects, and symbols:

> Walls separate people in places. The absence of walls allows people to be connected. The thickness, consistency, and materials of walls influence the quality of separation. For example, walls with no soundproofing betwen bedrooms provide neighbors with aural opportunities (and inhibitions) that denser walls do not. Screens--glass panels, a garden hedge, doors, counters, windows--separate and connect people more selectively than complete walls. Glass can enable visual connection but tactile separation; a shower curtain, the opposite.... Objects form another class of barriers. Things placed in space may be perceived as space dividers or connectors: a piece of sculpture on a public plaza as a separator or as a place to meet; a couch in a living room; a tree in a garden. Finally, symbols can be barriers. Color changes in the rug around a public telephone and change in ceiling height in a room [implicitly] signal that someone considers this space to be two separate places, perceptually. (pp. 132-134)

Archea (1977) postulates that people position themselves around fixed features of design, such as doors and partitions, in order to facilitate privacy regulation. These physical elements represent the barriers Zeisel describes. Mehrabian (1976) proposes that the amount of social interaction also depends upon the line of vision and positioning of fixed and semi-fixed design features, such as raised floor areas, the angle of furniture and accessories. Sundstrom (1985) applies Altman's theory on the regulation of interaction to clarify this further:

> Partners in conversation seek an optimal psychological distance, which is adjusted through interpersonal proximity, eye-contact, and others behaviors. Applied to the work environment, this theory implies that conversants are more comfortable in seating arrangements that allow them to adjust their distance (or other cues of immediacy) to suit their preferences. (p.184)

The literature on privacy regulation indicates that privacy is most consistently regulated through physical enclosure of the work space by walls or partitions (BOSTI and Brill, et al., 1984, 1985; Ellis and Duffy, 1980; Hedge, 1982; Marans and Spreckelmeyer, 1982; Sundstrom, 1986; Sundstrom, et al., 1980; Sundstrom, Herbert, and Brown, 1982; Sundstrom, Town, and Brown, et al., 1982). This further substantiates Zeisel's description of barriers. Physical enclosure helps to regulate visual, olfactory and acoustical privacy.

Psychological Functions of Privacy Reinforced by the Physical Environment

Designers use physical elements to reinforce the psychological functions of privacy, as outlined by Westin and Altman. Rapoport (1976) postulates that one of the functions of the environment is to maintain self-identify--the main psychological function of privacy theorized by Altman. The research of Hansen and Altman (1976) demonstrates that personalization of a space helps to maintain self-identity and commitment to place. Their research analyzed the relationship between territoriality and freshmen progress. Students who personalized their dorm rooms through artifacts, early on and most frequently, tended to perform better and remain in school longer than those who did not personalize their dorm rooms. Hansen and Altman concluded that personalization of a space reflects the degree of commitment to a place and helps to maintain self-identity.

Symbolic Value of Privacy: Status Demarcation Reinforced by the Physical Environment

Steele (1973) asserts that people may prefer private workspaces because they often signify status or importance. Davis (1977) describes "status" as the value placed on an organization or social system by comparison to other members. It usually corresponds to an individual's formal rank in the organizational hierarchy. Higher ranks have acquired more privacy privileges. Konar, et al. (1982) describe the process of status demarcation as one in which a person's position in the organizational hierarchy is symbolically indicated by the nature of his/her work facilities.

Symbolic signs of status appear to be evident in most organizations, and are believed to be reflected in certain environmental and social mechanisms. Steele (1973) points out that early research consisted mainly of anecdotal evidence regarding the role and nature of environmental status demarcation. Later studies have empirical substantiation, examining certain physical elements that designers deploy or devise, such as floorspace, degree of enclosure (e.g., accessibility), layout, size and quality of furnishings and personalization (see Konar, et al., 1982). This research confirms earlier general assertions that high-ranked people typically have more common status markers--space, furnishings, capacity to personalize and privacy. Joiner's 1977 research reveals that spatial zones are demarcated through placement and orientation of desks to office doors. The space behind desks is considered to be "private," with higher status positions claiming a larger portion of their office as private than lower positions.

There is speculation regarding the types of organizations in which status marking is most important. Konar, et al. (1982) assert that environmental status support may be less critical for public sector employees than for private sector employees, given the bureaucratized nature of public sector organizations and the formal hierarchy explicitly identified by Government Service ranks. Sommer and Steiner (1988) generally concur with this, although rival factors are present. They observe that competition for space tends to be infrequent and highly ritualized in legislative offices within a state capitol. Criticality of environmental status markers, though seemingly lacking with regard to space allocation, may be influenced by other factors. The investigators note that legislative members are allowed to personalize their offices, and space allocation appears to be adequate across ranks.

Privacy and Job Satisfaction linked to the Physical Environment

Herzberg (1968; and Herzberg, Mausner, and Snyderman, 1959) and Locke (1983) point out that the physical environment is primarily associated with job dissatisfaction--not job satisfaction. Herzberg theorizes that the motivational factors influencing job satisfaction are separate and distinct from those negative hygienic factors influencing job dissatisfaction. Herzberg argues that eliminating negative factors, such as physical environmental features, will not create job satisfaction.

The latest empirical research of Crouch and Nimran (1989) provides documentation that may refute this, pending further research. Their research reveals that the physical environment (including architectural privacy) has both positive and negative behavioral effects. Respondents in their study perceived the physical environment to facilitate and inhibit work performance. Grouped frequency distribution is tabulated in Table 1 for those factors perceived as facilitating and inhibiting work performance.

Crouch and Nimran point out that a direct assessment of satisfaction with the physical environment cannot be made, as no measure of satisfaction was employed in the Australian study. Empirical research in the United States, however, indicates a positive relationship between privacy and job satisfaction (Sundstrom, et al., 1980). Caution is advised in generalizing from the research of Crouch and Nimran at

Table 1 Excerpt from "Factors of Office Environment Perceived as Facilitators and Inhibitors of Work Performance" cited in Environment and Behavior Vol. 21 No. 2, p. 216
(Crouch and Nimran, 1989)

Office Environment Characteristic	Facilitators	Inhibitors
Social Interaction	41%	16%
Physical and ambient conditions	21%	20%
Utilities	10%	10%
furniture and equipment		
available technology		
Information and communication	18%	11%
Workplace experience	11%	43%
privacy and distraction		

the present time, as positive and negative attributes of the physical environment may not be equally salient across cultures.

Cultural Variability of Environmental Mechanisms

No cross-cultural research that empirically examines privacy regulation in work environments from developed countries is reported. This includes physical elements devised or deployed by designers as regulatory mechanisms--the focus of the present project. Hall (1966) documents privacy regulation in certain developed countries, but does not hold behavior settings constant. Although Hall groups work with living environments, he nevertheless offers insight into culturally specific mechanisms regulating privacy. Hall theorizes that sensory input, stimulated by attributes of the physical environment, is molded and patterned by culture. He lists culture-specific examples of physical elements and design practices that facilitate and impede privacy regulation. Hall holds that mechanisms used to regulate privacy depend upon cultural contexting patterns. Germans, a "low context" culture, primarily rely on environmental mechanisms, such as thick walls and double doors, to regulate privacy. They have difficulty if they must rely on their own powers of concentration to screen out sound. Japanese, a "high context" culture, traditionally rely on behavioral mechanisms to regulate privacy; as reflected in thin sliding partitions used as acoustical screens in Japanese homes. (See, for example, Kimura and Sime, 1986.)

The global impact of information technology may alter some of Hall's assertions regarding the dependency of privacy regulatory mechanisms on the contexting pattern of cultures (from high to low). For example, Japanese reliance on behavioral mechanisms to regulate privacy appears to be changing, even though they are considered to be a high context culture. Shoji Ekuan (1985), Director of the Japanese GK Institute, offers valuable insight:

> Traditionally, Japanese do not pay attention to [architectural] privacy as much as Westerners do. Because of this, Japanese office workers prefer the shared space to cell-like, private rooms. Put into such a room, they would tend to feel more isolated than privileged. Things seem to be gradually changing...in favor of protecting [architectural] privacy.... In contract [sic], private rooms are favored by the designers and engineers. It is predicted that as the number of professionals increases with the advent of the information age, office space will likely be partitioned in one way or another. (p. 305)

Behavioral Mechanisms

The user's role in the environment is not passive (Moore and Golledge, 1976). People actively anticipate events so they can make decisions about behavior. They modify the environment (usually through semi-fixed features of design and personal space) or modify themselves to the environment (readjusting perceived QL and QWL standards). These exemplify the active role the user plays in the environment. (See Hall (1966) and Rapoport (1976) for an in-depth discussion of semi-fixed feature space and personal space.)

Modifying the environment and modifying oneself to the environment facilitate privacy regulation through overt and cognitive behaviors.

Overt Behavior

Extensive research has been conducted on personal space, territoriality, and verbal/nonverbal behaviors. (See Altman and Chemers, 1980 for a review.) Most of the research, however, does not specifically examine these overt behaviors as mechanisms used to regulate privacy. Altman and Chemers (1980) point out that the literature on personal space typically examines the effect of personal characteristics of people, intimacy of social relationships, and other variables on distancing behavior. Also, territoriality is usually examined as if it were a separate process, independent of privacy.

The limited empirical research that exists on these overt behaviors as privacy regulating mechanisms is provided predominantly by Altman. Altman (1975, 1976, 1977), Altman and Chemers (1980), Altman and Vinsel (1977), and Davis and Altman (1976) discuss these mechanisms. This research, primarily concentrating on personal space and territoriality, is briefly summarized in the following two sections with specific reference to Altman and Chemers.

Nonverbal/Verbal Behaviors, Personal Space, and Territoriality

Altman and Chemers (1980) address nonverbal/verbal behaviors used to regulate privacy, but cite no empirical research. Paraverbal communication cues are described as "letting people know our feelings regardless of the content of what we say" (p. 79). Nonverbal communication cues are defined as the body language used to communicate the desire for privacy: posture, head gestures, opening/closing of the arms, smiles/frowns, orientation of the body, and so forth.

Altman and Chemers empirically examined how personal space and territoriality are used to regulate privacy. They describe personal space, or interpersonal distancing, as a communication vehicle used to maintain an "appropriate" or "desired" level of contact. It is an important means of privacy regulation that continually changes with circumstances. Altman and Chemers stress that human territoriality, the process of establishing and controlling a territory, is extremely complex. It consists of many properties and dimensions, including:

1. Particular control and ownership depends upon the type of territory (e.g., primary/secondary/public).
2. The scale of territory may be small or large (e.g., objects/rooms/homes/communities/nations).
3. Ownership may be by a person or group.
4. Territoriality primarily serves to maintain personal identity and to regulate social systems.

Territoriality, identified by Altman as a behavioral mechanism, is established and controlled through territorial markers that delineate boundaries. Environmental mechanisms are used as territorial markers, in addition to overt behavioral mechanisms. They are interrelated as both are used to delineate boundaries.

Cognitive Behavior

A more comprehensive perspective of how privacy is regulated requires a theoretical introduction to cognitive behavior as it relates to privacy regulation. A brief overview is given only, since this behavioral mechanism is outside the scope of the present project.

Minimal research exists in this area. Rapoport (1976) proposes that privacy is regulated by cognitive behavior through depersonalization. Depersonalization, however, emphasizes withdrawal and omits the dialectic nature of privacy regulation. Mehrabian (1976) theorizes that privacy is regulated through stimulus screening of environmental conditions, a cognitive behavior.

Stimulus Screening

Mehrabian (1976) postulates that stimulus screening facilitates privacy regulation. He defines stimulus screening as "how much a person characteristically screens out the less relevant parts of his environment, thereby effectively reducing the enviromental load and his arousal state" (p. 24). Mehrabian describes environmental load as the amount of information perceived in the environment in the form of stimuli. Of the three dimensions, the arousal/nonarousal dimension of emotional reaction is the most directly connected to the environment. The more environmental stimuli emotionally responded to, the greater the arousal state, and vice versa.

Individuals differ in their ability to screen environmental conditions (Baum, et al., 1981; Becker, 1981; Mehrabian, 1976; Wineman, 1986). Mehrabian (1976) categorizes individual differences as nonscreeners and screeners. Nonscreeners are those who are less selective in what they emotionally respond to in the environment. Screeners are described as those who are more selective in what they emotionally respond to, with less relevant stimuli screened out.

Mehrabian compares these differences in screening for acoustical privacy:

> Supposing Mr. Jones, a screener, and Mr. Smith, a nonscreener, are in your living room having a quiet, relaxed conversation when suddenly...there is a sonic boom. Mr. Smith, the nonscreener, will startle, bolt upright in his chair, and possibly lose his train of thought. Mr. Jones, the screener, on the other hand, will at most turn his head in the direction of the sound.... Mr. Smith's arousal level will shoot up whenever his environment gets loaded...and will take a longer time coming down. Mr. Jones' arousal level will not go up as nearly as high and will come down more quickly. This does not necessarily mean that Mr. Smith is more nervous, anxious, or tense than Mr. Jones. Low levels of stimulus screening simply index less selectivity and therefore more amplified arousal responses to different situations--whether pleasant or unpleasant. However, we can say that nonscreeners have a more delicately or more finely tuned emotional "mechanism." They will thus be relatively sensitive to smaller

> variations in stimuli and may be put out of whack by relatively gross ones. (p. 25)

Wineman (1986) recommends environmental diversity in design of work environments in order to compensate for individual screening differences. The unprecedented scale of new information technologies in the workplace has created new demands on facility design and management. Designers and facility managers are confronted with the possible and probable repercussions of new technologies regarding spatial arrangements and management, individual work and group workplaces, storage and archiving spaces, spaces required for mechanical systems, etc. (see Goumain, 1989). Technological change and growth has impacted environmental overload, (i.e., too much information perceived in the environment), arousal state, adaptation, fatigue, and stress.

Concern with health factors, such as stress, is so paramount that Federal agencies obligated 14 million dollars for research into office health hazard problems during the fiscal years 1980-1986. Seven Federal agencies directed research projects involving real and potential office health hazard problems associated with job stress, indoor air pollution, asbestos, and video display terminals (see GAO, 1986; OTA, 1985).

Sundstrom (1985) reviews prevailing theories on psychological/ physiological processes and their potential limitations regarding adaptation. He emphasizes the need for long-term research on the impact of technology on adaptation. Baum, Singer, and Baum (1981) caution that cumulative instances of stress have deceptive consequences. Regular and prolonged exposure to stress may require far more adaptive responses over time than temporary exposure to stress. Current research on stress is examining two key areas: (1) psychological and physiological stress caused by uncomfortable working conditions; and (2) increased actual and perceived control that has the potential to increase job satisfaction and help decrease stress (see Baum, Singer, and Baum, 1981).

Cultural Variablity

No cross-cultural research exists that empirically examines behavioral mechanisms used to regulate privacy in work environments from developed countries. The cross-cultural research of Altman (1975, 1976, 1977) and Altman and Chemers (1980) examines overt behaviors used to regulate privacy in tribal environments. Their research offers scientific documentation that may apply to work environments in developed countries, pending further research. The research examines cultures appearing to have maximum and miminum privacy levels in exploring the hypothesis of privacy regulation as a cultural universal. In all cases, overt behaviors are identified that enable people to regulate their interaction with others. The dialectic nature of privacy regulation (open/closed, accessible/inaccessible) was supported. Their examination also substantiated the second aspect of their thesis, which is the existence of culturally specific behavioral mechanisms used to regulate privacy. Altman and Chemers (1980) point out that the theory of privacy regulation as a cultural universal is in its formulative stage. This is due to the many complexities and difficulties in making inferences from the secondary data examined.

Social Mechanisms

The present project asserts that social mechanisms are social and policy supports governed by the cultural institution through accepted practices, mores, rules, and roles in a behavior setting. Work environments constitute the organizational climate within which privacy regulation takes place. They represent a cultural institution as an institutional occupation system. Social and policy supports regulate privacy through the structuring of activities in space and time (see Rapoport, 1976.) Becker (1981) posits that we experience the environment by altering the ways in which we structure such things as time and movement patterns, a process of organizing that occurs continually in all organizations.

Salancik and Pfeffer (1978) argue that social context provides cues on appropriate behavior and attitudes. Steele (1973) directs attention to factors outside both the individual and the physical environment:

> One of the often overlooked functions of settings in an organization is the provision of means for social control: the application and enforcement of policies and social norms on the members of the system, so that there is some predictability or patterns to what people will and will not do there. (p. 94)

Office norms affect the way the user identifies, interprets, and uses the physical environment and social aspects of the physical environment (Justa and Golan, 1977). U.S. Office of Personnel Management manuals now address this--a cue to the increasing importance placed on office norms.

Formal and Informal Policy Supports

Formal policy supports are explicit rules that outline activities (including job responsibilities) considered to be appropriate and inappropriate by the organization. Steele (1986) identifies several policy support types:

1. Policies that regulate use restrictions on certain facility spaces (i.e., who can reserve conference rooms, use corporate exercise spaces, etc.).
2. Policies that regulate personal workplace elements, depending upon the employee's organizational hierarchy (i.e., status demarcation reinforced by design elements including floorspace, degree of enclosure or accessibility, layout, size and quality of furnishings, and personalization).
3. Policies that regulate the degree of personalization of the workplace for individual employees as well as groups (reflecting the character of the organization, in addition to status demarcation).

Informal policy supports are implicit rules that influence activities considered to be appropriate and inappropriate by the organization. They define levels of environmental ambiguity and flexibility (Becker, 1981). Steele (cited in Becker, 1981) observes informal policy support in the work environment:

> A middle-level manager decided that his desk had faced the door of this office for too long. It was time for a change, so he turned it around to face a side wall. The next day he found a memo on his desk from the president's assistant saying that it had been found that the most effective way for managers to arrange their offices was with the desk facing the door so others would feel welcome. He was instructed to return his desk to its old position, with the firm implied threat of no longer being considered an effective office manager if he did not. He later discovered that there was only one exception to the desk-toward-the-door rule: the president's office. (p.49)

Social Supports

Social supports are informal social norms that implicitly cue what people should and should not do in a given work setting. Steele (1986) illustrates spatial behavior norms along with norms referring to specific items or setups in a workplace, such as whether or not an office door should remain open or closed while the occupant is there. Spatial behavior norms in a setting implicitly cue behaviors such as how loudly or softly one should talk on the telephone or to people in the workplace, and when it is acceptable and not acceptable to enter someone's workspace.

Social and Policy Supports Used to Regulate Privacy

Empirical research examining social mechanisms used to regulate privacy in the work environment is minimal to nonexistant. The research of Justa and Golan (1977) provides the most detailed documentation to date on policy and social supports that facilitate and impede privacy regulation, in addition to environmental mechanisms. Policy supports that Justa and Golan identified in the study include: a well-defined access policy; ability to exercise control (over thermal and aural environments); individual choice of decor; and autonomy over confidential employee files. Social supports they identify include: consensus on meaning of enclosed office as occupant's territory; secretary to screen calls and visitors; low noise and low density from others (e.g., "accepted" conversational and density levels); and discretion on the part of others.

Justa and Golan conclude that privacy cannot be achieved exclusively through the manipulation of environmental mechanisms alone. This has important implications for privacy regulation in the work environment. Attempting to solve privacy-related problems exclusively through design elements is not sufficient. The research of Sundstrom, Town, and Brown, et al. (1982) discussed earlier, corroborates this. In one study, clerical workers in walled offices reported less privacy than managers did in offices with equivalent exposure. The investigators assert that this is because different job tasks create different privacy needs. Additionally, social and policy supports may not have been adequate to accommodate the particular privacy needs for that type of job. The present project proposes that perceived privacy needs are achieved through the combined interaction of environmental, behavioral and social mechanisms--as privacy regulating mechanisms.

Cultural Variability

Cross-cultural research examining social mechanisms employed to regulate privacy in tribal environments exists. Patterson and Chiswick (1981) investigated social mechanisms that appear to regulate privacy in the Iban of Sarawak, Borneo. In addition to certain behavioral mechanisms (personal space and territoriality), Patterson and Chiswick identify social mechanisms: intra-family group privacy; individual control of social ties; modesty; intra-family separation; norms of social interaction; separation of sex roles; and exclusion of strangers. The researchers conclude that social mechanisms facilitate privacy regulation where the physical environment limits privacy regulation.

Altman (1975, 1977) and Altman and Chemers (1980) provide further cross-cultural examination of mechanisms used to regulate privacy in tribal environments. These studies analyze existing ethnographic accounts of social relationships. Descriptive accounts of mechanisms used to regulate privacy include social mechanisms, but are generally classified as "cultural practices."

CONCLUSION

This chapter provides the theoretical grounding for the present project in light of current theory on privacy. Answering the research question, "What physical elements deployed or devised by designers do users perceive as regulating privacy?" entails testing important conceptual/theoretical notions still in their formulative stage. The holistic model of privacy regulation presented in this chapter guides the research for the present project. The model's ultimate value is the further refinement of privacy regulation, conceptually and operationally. It posits a comprehensive conceptual framework of privacy regulation and suggests a more detailed method for classifying mechanisms based on regulatory characteristics.

CHAPTER IV

EMPIRICAL MEASUREMENTS OF PRIVACY: CURRENT PRACTICES, LIMITS, AND DIRECTED-MEANS FOR IMPROVING THEM

Major research questions raised about privacy reflect the complexity of privacy as a concept:

How are zone definition and territoriality achieved in the private office? (Joiner, 1971)

What are the major sources of complaint concerning working conditions in the workplace? (Brookes and Kaplan, 1972)

Can problems related to privacy be solved exclusively through the manipulation of design features? (Justa and Golan, 1977)

Is privacy associated with satisfaction with the workspace? (Sundstrom, et al., 1980)

How can attributes of privacy be measured? (Curtis, 1981)

When environmental mechanisms appear to limit privacy regulation, how is privacy regulated? (Patterson and Chiswick, 1981)

What design features are perceived as regulating privacy in the work environment?
What are the most important design features associated with privacy?
Do privacy needs increase with job complexity?
(Sundstrom, Town, and Brown, et al.,1982)

Can the work environment have a positive impact on job performance and/or job satisfaction? (BOSTI and Brill, et al., 1984; 1985)

Research questions specific to specialized environments, such as NASA space stations, further reflect the complexity of privacy as a concept:

What privacy elements should be incorporated in space station design to accommodate heterogeneous crews? How can selection and training procedures and the development of appropriate social norms help groups of astronauts achieve desired privacy levels? (Harrison, Caldwell, and Struthers, 1988)

CURRENT PRACTICES

Research Design

Sundstrom (1986) in Workplaces: The Psychology of the Physical Environment in Offices and Factories presents a breakdown of empirical studies cited in his book that examine the physical environment in offices and factories. Sundstrom acknowledges that this table underestimates research that has been conducted, however, it does provide a brief overview of research design practices. Case studies, referred to in Table 2 as field studies, represent the research design most commonly used to examine privacy issues. Research, in general, examining aspects of the physical setting in the workplace seems to have concentrated on the privacy issue.

Research to date on the physical setting of the workplace is also characterized by a short time perspective (Becker, 1985). This may reflect the realistic nature of deadlines to be met within corporate culture. Environmental researchers and designers as practitioners have different approaches and perceptions. Erroneous ideas abound regarding the roles of the researcher and practitioner as well as the nature of information transferred from the former to the latter. Decision makers, therefore, grow frustrated when the research requires a long time perspective; when the research fails to include variables viewed as critical; and when the researcher is hesitant to make project-specific design decisions on the basis of general theoretical data (Weisman, 1983). Susman and Evered (1978) argue that practitioners view research as simply an "accumulation of social facts that can be drawn on by practitioners when they are ready to apply them" (p.582).

Table 2 "Empirical Studies Concerning the Physical Environmental in Offices and Factories" cited in Workplaces: The Psychology of the Physical Environment in Offices and Factories, p. 61 (Sundstrom, 1986)

Level of analysis and topic of study	Numbers of studies cited: Laboratory experiments	Field experiments	Surveys	Field studies	Totals
Individual worker					
Lighting	13	1	—	5	19
Windows	—	—	3	1	4
Temperature	27	2	2	8	39
Air quality	4	—	2	1	7
Noise	72	1	1	1	75
Music	9	9	1	—	19
Color	25	—	1	—	26
Work-stations	2	—	5	1	8
Interpersonal relations					
Status	—	—	1	1	2
Personalization and participation	—	1	1	3	5
Ambient conditions and interaction	8	—	—	—	8
Proximity of workspaces and interaction of groups	—	—	—	9	9
Room layout and interaction	11	—	1	9	21
Privacy and enclosure	—	—	4	8	12
Seating arrangement and group discussions	12	—	—	—	12
Organization					
Organization, structural and physical layout	—	—	—	1	1
Comprehensive studies and postoccupancy evaluations	—	2	15	6	23
Totals	183	16	37	54	290

Note: An empirical study is a self-contained report of a research project that involved the collection of original data, with detailed descriptions of methods and results. Each study is counted only once, even if it has multiple experiments. Studies that share a common data base are counted separately if they report separate findings. Studies that deal with more than two of the topics are counted as comprehensive studies.

The short time perspective is also characteristic of research within the academic community (Bracey, 1987). Bracey, in a review of literature, concludes: "Experiments are too brief. A researcher reviewing one subject area found that the average length of an experiment was one week" (p. 44). Bracey proposes that this is one of the effects of the "stampede to try to fill 40,000 journals" in the behavioral and social sciences as well as in education.

Research Instrument

Attitudinal and Post Occupancy Evaluation (POE) survey questionnaires are most commonly used to collect data on privacy in the work environment. This is characteristic of research in general that examines aspects of the physical setting in the workplace. Attitudes, preferences, and POE's assessing user responses to a new office environment are typically emphasized in the survey questionnaires (Becker,1985). Some POE's have incorporated "retrospective surveys" in which the user recalls earlier work environments and makes comparisons with current ones. Another group of POE's incorporates a more rigorous research approach. This group utilizes a pretest/posttest, with surveys before and after relocation (Sundstrom, Herbert, and Brown, 1982).

The survey questionnaires are typically close-ended and access nominal and ordinal level data. Nominal level data are collected generally on "how often, how many, when, and where" issues. Ordinal level data are collected most often utilizing a semantic differential scale and preference ranking to measure user perceptions about privacy. Typical privacy descriptors used include noise control, disruptions and interruptions (or noise intrusions), control over accessibility, visual access, visual privacy, speech (or conversational) privacy, and people-related noise. (See BOSTI and Brill, et al., 1984; Hedge, 1982; Marans and Spreckelmeyer, 1982; Sundstrom, 1986; Sundstrom, et al. 1980; Sundstrom, Herbert, and Brown, 1982; Sundstrom, Town, Brown, et al., 1982; and Vischer, 1984, 1985.)

Multiple Methods of Data Collection

The use of multiple methods of data collection is limited in privacy research, but an awareness of its importance has been increasing since the 1980's. Some researchers have utilized triangulation to examine aspects of the physical environment including privacy. (See Ellis and Duffy, 1980; Sundstrom, 1986; Sundstrom, et al., 1980; Sundstrom, Herbert, and Brown, 1982; Sundstrom, Town, and Brown, et al., 1982; and Stokols, 1986.) Others have pointed out their error in not doing so (see BOSTI and Brill, et al., 1984).

Multiple methods of data collection, when used, most often incorporate non-manipulative direct field observation in combination with attitudinal and POE survey questionnaires. (See Ellis and Duffy, 1980; Sundstrom, 1986; Sundstrom et al., 1980; Sundstrom, Herbert, and Brown, 1982; Sundstrom, Town, and Brown, et al., 1982; and Stokols, 1986.) Field observation methods are used to examine physical traces and overt behaviors that may reflect privacy issues (Zeisel, 1984).

Physical traces are collected generally through photodocumentation, technical measurements, and recorded descriptions of the architectural space. Zeisel defines physical traces as changes people have made in their surroundings, both consciously and unconsciously. Visual properties are emphasized. A more contextual definition includes additional properties such as acoustical, optical, and hygrothermal conditions of the environment. (See ISO/DIS 6241, 1983, which categorizes physical conditions in the environemnt through physical performance attributes.)

Field observation of overt behaviors is rarely conducted in privacy research. This reflects the complexity of privacy as it is difficult to know if what is being observed is related to privacy or to something else. Altman (1975) and Patterson and Chiswick (1981) have conducted research on overt behavioral mechansims regulating privacy, but the literature continues to be minimal in this area.

Method of Data Analysis

Field Observation

Empirical methods used to analyze observational data are limited to quantitative analysis of technical measurements assessing building performance. (See CIB Report Publication 64, 1982, for a discussion of testing procedures.)

Empirical methods of qualitative analysis are rarely used to analyze aspects of the physical setting in the workplace, including privacy.

Exemplary tools for qualitative analysis have not been borrowed across disciplines. Spradley's domain, taxonomic, and componential analyses (1979) and Smith and Pohland's constant comparative method through tentative assertion lists (1976) represent valuable ethnographic tools for qualitative analysis. Moore, et al., (1984) propose that one of the current and future strategies for theory development should be paradigm-merging of research concepts and methods.

The lack of rigorous qualitative analysis may be indicative of Trend's (1978) assertion that observational data are used for "generating hypotheses" or "describing process," whereas quantitative data are used to "analyze outcomes" or to "verify hypotheses."

Attitudinal and POE Survey Questionnaires

The raw data on privacy collected from the survey questionnaires form the basis for quantitative analysis. Statistical methods commonly used are correlations and simple mean ratings. Research evidence validates this use of simple mean ratings that considers all raters equivalent, as opposed to more complicated scaling methods used to establish intergroup reliability (Schroeder, 1984). Univariate and multivariate analyses (ANOVA) along with multiple linear regression are increasing in use. This coincides with analysis techniques used across disciplines. A longitudinal study of statistical techniques used in the journals <u>American Psychology Association</u>, <u>Journal of Educational Psychology</u>, and the <u>American Educational Research Journal</u> indicates that to date

ANOVA and correlation analyses are used most often and that there was an increase in their use from 1972 to 1982 (Goodwin and Goodwin, 1985).

Exemplary research conducted by Sundstrom, et al. (1980) demonstrates statistical methods used to analyze privacy:

Study 1
Univariate and multivariate ANOVA analyses are used to determine if job level and and relocation impacted satisfaction with privacy, before and after relocation.

Study 2
A multiple linear regression analysis is used to predict job satisfaction and user satisfaction with the workspace based on physical design features such as "number of enclosed sides" and "amount of floor space" and subjective features such as a "pleasant place".

Study 3
A correlational analysis is used to determine significant Pearson Product Moment (PPM) correlations between design features and privacy.

Multiple Methods of Data Analysis

A review of privacy research reveals that the use of triangulation to analyze data has been limited to quantitative analysis. The triangulation of qualitative analysis has not been used for data collected through photodocumentation, technical measurements, and recorded descriptions of architectural space. Patton (1980), however, stresses that it is in data analysis that the strategy of triangulation is rewarded.

Trend (1978) summarizes the researcher's tension between quantitative and qualitative analysis:

> Though qualitative/quantitative tension is not the only problem which may arise in research, I suggest it is a likely one. Few researchers are equally comfortable with both types of data, and the procedures for using the two together are not well developed.

> The tendency is to relegate one type of analysis or the other to a secondary role, according to the nature of the research and the predilections of the investigators.... Commonly, however, observational data are used for "generating hypotheses" or "describing process." Quantitative data are used to "analyze outcomes" or "verify hypotheses." I feel that this division of labor is rigid and limiting. (p. 352)

CURRENT LIMITS

Credibility requires that the canons of reliability and validity be followed throughout the research process (Goetz and LeCompte, 1984). A review of the literature on privacy reveals its vulnerability to questions of reliability and validity. The major limit of this research is its failure to expose the personal constructs of the research subjects, the user of the environments examined. This is indicative of the method: inadequate procedures are used to operationalize the research question. The problem is not unique to privacy research. Neither is it new. Bracey (1987) cites Harlow's 1959 valedictory editorial in the Journal of Comparative and Physiological Psychology, which "blistered his colleagues for inundating him with studies using nutty methods to find answers to trivial questions. He said he had finally gotten a rubber stamp saying 'Not Read But Rejected'" (p.44).

Additionally, a misunderstanding of the basic concepts of privacy and what regulates it is also evident in the literature. Grosof and Sardy (1985) emphasize that the quality of observations and analysis is secondary to conceptualization of the definitions and validity of the measurements. Ventre (1986a) argues: "Show me your method and I'll [sic] tell you how good your research is."

Theoretical Misunderstandings

Harrison, Caldwell, and Struthers' (1988) report to NASA generally reflects the most common theoretical misunderstandings found in the literature on privacy in specialized/nonspecialized work environments. The following critique of this study points out these common misunderstandings:

Research Review
Incorporation of Privacy Elements in Space Station Design
By Harrison, Caldwell, and Struthers [1988]
National Aeronautics and Space Administration Grant, NAG2-431

In a review of representative topics, Harrison, Caldwell, and Struthers examine privacy elements that should be incorporated in space station design, and recommend guidelines to achieve desired privacy levels. Theoretical aspects of this report are misleading. The report equates privacy with "withdrawal" from people rather than privacy as a boundary regulating process. It is more than retreat from others, it is dialectic in nature. (See Altman, 1975; Goffman, 1969; and Simmel, 1950, translation by Wolff, on the dialectic nature of social exchange and presentation of self.)

The report cites Altman's privacy research, providing a theoretical foundation for the design recommendations. Yet some of the design recommendations contradict Altman's theory of privacy. Privacy regulation is <u>not</u> static, as the report implies in the design recommendations. Altman theorizes privacy as a dynamic changing process. Privacy levels change as the needs change for the individual.

Training in interpersonal relations and relaxation techniques may not reduce individual privacy requirements as the report proposes. The issue is more complicated. We need be to aware of when and under what social and spatial conditions the desire for privacy is important and when the circumstances facilitating privacy are responsive to user needs (Justa and Golan, 1977).

The conceptual framework of privacy is incomplete in the report as further evidenced in the loose terminology:

(a) Auditory privacy is defined as speech privacy (e.g., conversational) in the report. Environmental background noise is omitted, yet it is also a dimension of auditory privacy. It is important to include both dimensions, as emerging empirical data suggest that occupants experience and judge "noise" differently from "speech privacy" (Sundstrom, 1982, 1985; Vischer, 1985).

(b) Three of the four psychological functions of privacy, as theorized by Westin (1970) and cited extensively in the literature, are omitted from the report: the need for emotional release; the need for self-evaluation; and the need for autonomy. The report only specifically addresses the fourth psychological function of privacy, which is need for limited and protected communication with others (e.g., secrecy). The report indirectly addresses the need for self-evaluation and the need for emotional release by discussing the need for "rest and relaxation" and the need to "adjust images that people project." The reader may not understand that these two variables indirectly refer to Westin's functions unless he/she is familiar with the literature.

(c) The report also omits the need for maintaining self-identity as a function of privacy, as theorized by Altman (1975). This is puzzling as Altman's research is cited in the report. Altman argues that Westin's four psychological functions are all in the service of maintaining self-identity--the main psychological function of privacy.

Inadequate Procedures Used to Operationalize the Research Question: General Overview

There are problems with the procedures used to operationalize research questions on privacy in specialized/nonspecialized work environments. Studies conducted by Harrison, Caldwell, and Struthers (1988) and BOSTI and Brill, et al. (1984) typify the wide range of prcedural problems found in the literature. A critique of these studies is presented as a general overview of procedural problems:

Research Review
Incorporation of Privacy Elements in Space Station Design
By Harrison, Caldwell, and Struthers [1988]
National Aeronautics and Space Administration Grant, NAG2-431

The report submitted to NASA by Harrison, Caldwell, and Struthers (1988) reveals the lack of cross-cultural information on privacy and its regulation for space station design. No experimental, quasi-experimental, survey, or case study designs reported to date specifically examine privacy for space station habitability cross-culturally. Harrison's report superficially examines cultural characteristics that should be considered in accommodating heterogeneous crews. The report skirts this important issue by quoting Raybeck's 1987 review of literature and citing cross-cultural research provided by Altman (1975) and Hall (1959, 1966):

(a) Raybeck's five cultural characteristics cited in the report are vague. This ambiguity raises questions:

1. Are the behavior settings held constant?
2. Are rival factors such as age, gender, status, socioeconomic background, sample size, and ethnicity controlled for in the cross-cultural comparisons?

Direct application of this information to space station design is suspect.

(b) Behavior settings in Hall's cross-cultural research are not held constant, which may diminish the validity of his findings.

(c) Behavior settings in Altman's research are tribal environments from developing countries--not industrialized settings. There is a potential danger in applying concepts that deal with tribal environments to industrialized space station settings.

(d) Potential methodological problems in Altman's research further complicate applying Altman's findings to industrialized space station settings:

1. There are potential problems with emic/etic points of view. Altman, himself, in Altman and Chemers (1980) stresses the importance of using an emic orientation (i.e., examining a

culture according to its own value system and common views of the world) instead of an etic orientation (i.e., examining a culture based upon another culture's values and common views of the world). (See Brislin for emic/etic applications to cross-cultural research, 1980.)

2. There are potential problems with a "shared meaning of concept" (i.e., Is the concept related to privacy regulation or to something else?)
3. Altman analyzes existing ethnographies for his data base. There are dangers in using secondary data. False conclusions may have been reached by the original researchers; as well as cultural descriptions may not be explicit enough regarding privacy and its regulation.

It is for these reasons that Altman and Chemers (1980) emphasize that privacy regulation as a cultural universal is still in its formulative stage.

Research Review
Using Office Design to Increase Productivity
By BOSTI and Brill, et al. [1984]
Published by Workplace Design and Productivity, Buffalo, NY

The Buffalo Organization for Social and Technological Innovation (BOSTI) and Brill, et al. conducted a comprehensive five-year study investigating the effects of eighteen factors, including privacy, on human performance and satisfaction in the work environment (1984). The factors reflect aspects of the physical design of the workspace.

BOSTI and Brill, et al. claim their research substantiates that the design of the physical environment has significant, measureable effects on performance and satisfaction. Although this study represents a pioneering effort worthy of examination, it is inherently weak in execution. Analysis of this research indicates that the data are not reliable enough to determine the effects caused by factors acting separately or collectively:

(a) The survey questionnaires yielded a 30% return rate, which is not adequate to establish the external validity of the research findings. Babbie (1983) stresses that "adequacy" requires a response rate of at least 50%.

(b) The control group was extracted from the data base post hoc, rather than establishing a predetermined control group. This can be a less rigorous method of experimental control, depending upon the basis of selection.

(c) A multivariate analysis was conducted with repeated measures "over time" and over "office change." A pretest/posttest design was followed, with a questionnaire given before and after relocation. Subjects responding to the pretest, however, were not necessarily the same subjects responding to the posttest.

(d) The study was limited to a POE survey questionnaire to collect data. Multiple methods of data collection were not used. In retrospect, BOSTI and Brill, et al. acknowledge that "physical data should have been collected (through field observation) in order to supplement office workers' observations and to test the accuracy of workers' descriptions" (p. I- 388). The more

> triangulation used in research <u>decreases</u> the likelihood that the theoretical constructs, data generated, and conclusions reached have been contaminated by the research process itself (Denzin, 1978; Webb, et al., 1966; 1981).

The Koffler Group (1986), in light of these and additional limitations, recommends that the study's results be viewed "simply as trends or hypotheses about environmental effects on the bottom line measures, rather than facts that can be generalized to any workplace" (p. 16).

<u>Inadequate Procedures Used to Operationalize the Research Question: Specifics</u>

Major threats specific to internal validity consistently emerge in privacy research. The following critique examines specific procedural problems:

Failure to Expose Personal Constructs

Survey questionnaires are most commonly used to collect data on privacy in the work environment. A major error continues to surface causing problems with the instrumentation: failure to expose the personal constructs of the research subjects, the user of the environments examined. This is the major limit of privacy research and threatens internal validity. The survey questionnaires are rarely in the user's language so there is no <u>shared meaning</u> of privacy as a concept (e.g., "false friend"). Instead, categories are predetermined by the investigator. Additionally, the range of user responses does not exhaust the user's perceptions of privacy, privacy needs, and privacy regulators.

Example 1

Vischer (1985) investigated subjective ratings of environmental conditions as an alternative paradigm for evaluating building quality. Privacy was one of seven dimensions of occupant comfort measured as a gauge of building quality. The attitudinal survey questionnaire used in the study labeled voice privacy as "good" versus "bad." This is potentially misleading. The reliability of the instrument is suspect as there is no way of knowing from the ratings if the respondents share the same meaning for "good" versus "bad." Jones (1986) points out that psychological meanings assigned to words used to rate a condition, such as "bad, good, and excellent," can vary even from East to West coasts in the United States.

Example 2

Stokols (1986) describes innovative efforts to standardize a set of questionnaires for use in facilities programming and evaluation studies. Stokols argues that questionnaires should be sufficiently broad rather than focusing on a limited set of conditions within the workplace. One of the wide range of issues addressed is privacy, in which respondents rated the categories "overall noise control, conversational privacy within your office, and visual privacy within your office." A more focused examination of privacy than this study allows reveals that there is a potential problem with the shared meaning of privacy as a concept.

This is evidenced in the survey responses:
"Hear others' conversations" is part of the negative response given for both overall noise control and conversational privacy (e.g., speech privacy). It is impossible to determine if respondents perceive "overall noise control" as relating to conversational privacy only, or if the respondents perceive no problems with environmental background noise within the noise control category. See Table 3.

Lack of Control of Rival Factors

Problems arise with the testing procedures when variables such as job type, rank, business sector, type of office, ethnicity, length of employment, and geographic location are not held constant. Rival explanations will continue to threaten internal validity until these factors are controlled.

Example 1

Brookes and Kaplan (1972) investigated working conditions for an office prototpye. The study concludes that "noise level, visual distractions, and loss of privacy" are considered to be major sources of complaint. Certain rival factors were not controlled for in the study:

(a) Design features associated with privacy were not distinguished from design features associated with other office attributes, such as physical comfort.

Table 3 Excerpt from "Ratings of Environmental Features" cited in "New Tools for Evaluating Facilities Design and Productivity," p. 25 Paper presented at IFMA (Stokols, 1986)

Environmental Feature	Your Rating of Each Feature Excellent Good Fair Poor 4 3 2 1 (Avg.)	Average Minutes/Day of Productive Work Time Lost Due to "Fair" or "Poor" Features of the Environment	Examples of Negative Impacts on Individual and Group Performance Resulting from "Fair" or "Poor" Features of the Environment
overall noise control	[omitted from excerpt]	[omitted from excerpt]	hear others' conversations; reduced concentration; stress
conversational privacy within your office	[omitted from excerpt]	[omitted from excerpt]	hear others' conversations; delays in placing private calls; moving around to locate private area

(b) Social and policy supports were not controlled for. The researchers acknowledged that it is not known if "personal space control, noise, and privacy" are inadequate due to management policies and employee attitudes or to the architectural design. Justa and Golan (1977) point out that privacy cannot be achieved exclusively through the manipulation of design features alone.

<u>Example 2</u>

Joiner (1971) examined zone definition and territoriality in the office setting cross culturally. Business sector and rank were held constant, but other variables were not:

(a) The type of office, open plan or private, was not held constant.

(b) Specific countries targeted were not completely identified. Instead, the "United Kingdom" and "London" cultural groups were grouped together to compare with the Swedish sample group.

<u>Example 3</u>

Vischer (1984) investigated how employees assess environmental qualities of a building. Building-wide and individual workspace assessments examined environmental attributes through an attitudinal survey questionnaire. Privacy descriptors "voice privacy, noise distractions, and visual privacy" were ranked based on occupants' preferences. Occupants' profiles were broken down into age, sex, income, job type, and time in the building. Occupants' preferences, however, were not categorized according to their profiles. Consequently, rival explanations involving age, sex, income, job type, and time in the building cannot be eliminated.

Inadequate Measurement/Observation

Problems arise with the instrumentation when the researcher(s) do not actually measure or observe what they think they are measuring or observing. Solving this dilemma is a fundamental requirement for any research design (Campbell and Stanley, 1963; Cook and Campbell, 1979; and Goetz and LeCompte, 1984). Internal validity is threatened when this problem is not resolved.

Example

Curtis (1981) experimented with a computer program to accurately measure acoustical privacy. The program was developed to assess noise reduction through interior finishes/equipment and sound masking. This only partially measures acoustical privacy. Herbert (1980), an architectural acoustics consultant, identifies three variables needed to adequately measure acoustical privacy. The third variable, which Curtis excluded from the study, is the "distance required to support the privacy level needed."

Problems with Selection and Regression

Problems arise with selection and regression by not providing a heterogeneous sample (Denzin, 1978). Representativeness of the sample with no extreme cases is then suspect.

Example

Ellis and Duffy (1980) examined proponents' claims of the open plan office for a multinational client with offices located in four European cities. Individuals were sampled from each job level represented in the firm. The researchers conducted interviews with 10% of the employees in the four locations. The small sample size potentially limits the probability of a representative sample with no extreme cases. It should be noted that selection of the small group may be due to a language barrier--perhaps only 10% of the employees spoke the language of the researchers. All future research endeavors in multinational corporate settings will need to address this shortcoming.

DIRECTED MEANS FOR IMPROVING CURRENT PRACTICES AND LIMITS OF PRIVACY RESEARCH

Current practices and limits of privacy research in the work environment denote the dominance of positivism as a methodological paradigm in environmental design research. Susman and Evered (1978) and Weisman (1983) propose that many of the problems encountered in research utilization may reflect a crisis of epistemology. This is the consequence of adapting the traditional positivist model to environmental design research which is not capable of dealing with all the issues central to the study of environment and behavior.

The positivist model requires the researcher to make a sharp conceptual distinction between the knower (e.g., researcher) and that which is known (e.g., "facts"). To the positivist, the "facts" of human behavior are empirically real and exist independently in an external objective reality (Bredo and Feinberg, 1982; Eisenhart, 1985). Bredo and Feinberg (1982) question positivist assumptions about the nature of theories and explanations:

> A variety of criteria other than logical truth enters into the evaluation of a scientific theory and its acceptance, modification, or rejection, for a "correct" theory is something more than one that is merely logically true. In fact, even the use of logical criteria depends upon broader judgement of correctness of application. On

> this account, then, the positivist view of the nature of explanation and of the grounds on which even the most rigorous sciences accept or reject theories is much too narrow. (p. 24)

Environmental design researchers have challenged scholars to transcend the limits of positivism, since positivist approaches are not amenable to the articulation of user needs and purposess (Levy, 1987; Patricios, 1987; Ventre, 1986a; Weisman, 1983). Ventre (1986a), a constructionist, argues that because the quality of experience is subjective for user needs and purposes, it is legitimized through authenticity--not whether or not it is verifiable. Its validity is not absolute. It is arrived at by consensus (e.g., social agreement or due process).

An Alternative to Positivism

"Qualitative" is the most widely used term for the alternative to positivism, although authors have used different labels (Jacob, 1986). There is no uniform agreement on the necessary characteristics of qualitative research. What has been called qualitative research conveys different meanings to different people. See, for example, Jacob's (1986) comparison of research traditions illustrating the diversity of qualitative research approaches. The present discussion, however, is not intended to provide a comparative overview of philosophical and scientific research traditions.

The focus of this discussion is on one distinctive ethnographic method, the Heuristic Elicitation Methodology (HEM) guided by an interpretivist philosophy, that can provide a more accurate examination of privacy regulation in the work environment. Its distinction lies in how it legitimizes knowledge. The HEM is derived from anthropological theory and research.

Anthropology, the Discipline

Anthropology is an active social science discipline in environmental design research. It offers a "holistic approach tending to consider people in environments under conditions in a way that no other social science does" (Rapoport, 1976, pp. 12-13). Rapoport suggests contributions that anthropology can make to environment and behavior studies:

1. Broadening the sample, in space and time, on the basis of which generalizations about man-environment interaction are made.

2. Clarifying the relationship between constancy and cultural variability tracing regularities and limits, and suggesting baselines.

3. Looking at culture as a way of making consistent choices about ways of linking the physical and nonphysical environments.

4. Studying reasons for specific choices and considering the effect of world views, values, and motivations as well as the constraints and limitations of the natural environment, resource base, and technology.

5. Clarifying some of the mechanisms linking people and environments such as family structure, sex roles, cognitive systems, images and values, and the environment as a form of communication.

6. Considering the relation of culture change and changes in the built environment and hence providing important suggestions for design decisions.

7. Helping to clarify concepts such as privacy, crowding, and the like.

Interpretivism, the Philosophy

The HEM derives from the philosophical position, interpretivism. The goal of interpretivism is to find patterns in a socially constructed reality in order to provide holistic explanations of some social phenomena. Interpretivism does not pit anthropology against other disciplines (Reinharz, 1981). For instance, anthropologists Anyon (1980) and Willis (1977) are positivists, based on their ontology. These researchers are concerned with social theory, emphasizing the economic base in varying degrees as an external objective reality.

Interpretivism is not anti-quantitative--its distinction lies in the ontology guiding the method. Knowledge is legitimized through authenticity for the interpretivist. That is, human beings constitute or establish what counts as knowledge. "Facts" of human behavior are social constructions existing only by social agreement or consensus. The interpretivist believes there is an internal reality that is both subjective and intersubjective (Bredo and Feinberg, 1982; Eisenhart, 1985).

Beliefs, attitudes, and values constructed by the individual are private subjective meanings. Beliefs, attitudes, and values constructed between people are intersubjective meanings constitutive of their social institutions. Taylor (1971) further clarifies:

> It is not just that the people in our society all or mostly have a given set of ideas and subscribe to a given set of goals. The meanings and norms implicit in these practices are not just in the minds of the actors but are out there in the practices themselves, practices which cannot be conceived as a set of individual actions, but which are essentially modes of social relation, of mutual actions. The actors may have all sorts of beliefs and attitudes which may be rightly thought of as their individual beliefs and attitudes, even if others share them.... They bring these with them into their negotiations and strive to satisfy them. But what they do not bring with them into their negotiations is the set of ideas and norms constitutive of negotiations themselves. These must be the common property of the society before there can be any question of anyone entering into negotiation or not. (p. 27)

HEM, the Method

Conceptual Framework

The Heuristic Elicitation Methodology incorporates a candidate set of techniques that can help resolve many of the current limits of privacy research. The HEM consists of several elicitation techniques that, taken together, provide a means of collecting culturally specific perceptions in successive phases of elicitation where the subsequent questions/instruments are developed from the responses elicited in previous phases. It is for this reason that the techniques have been termed the "Heuristic Elicitation Methodology" (Harding, 1974).

The HEM is also widely accepted in the social sciences as a standard procedure in cross-cultural research (Harding and Livesay, 1984). Appropriateness of a research method depends upon the particular research question, behavior setting, and culture (Stea and Johnson, 1986). Some cultures learn predominantly from tacit rather than explicit knowledge, so that an environmental modeling technique may be more appropriate than direct questioning in order to elicit cognitive information (Stea, 1980, 1981, 1982). The HEM techniques, however, are adaptable to many cultural contexts as they are specifically designed to elicit the respondent's own catagories in his/her own language (Harding, 1974).

The goal of the HEM is to describe "cultural meaning structures," or the rules of correspondence which relate behavior to socially ascribed meanings. The objective is to match particular items and attributes with particular cultural values. Harding and Livesay (1984) point out basic assumptions underlying this research method:

> Basic to this approach is the assumption that people respond to their environments and decide what to do with their environments on the basis of how they conceive of them, what they believe about them, how they value them, and what their principles are for using them. ... A second feature of the strategy is that it utilizes the relationship between language and cognitive systems. Most cognitive anthropologists rely heavily on elicited verbalizations as the data base from which categories and beliefs may be induced. ... In other words, they assume that culturally meaningful aspects of the environment are labeled in the language and that beliefs about those aspects of the environment can be verbally encoded. In short, the methodology is founded upon the idea that language provides a powerful entry to cultural meaning structures. (pp. 74-75)

The integration of the interpretivist perspective and the HEM has not been utilized to examine privacy in the work environment to date. A review of the literature reveals that this type of integration has rarely been used in environmental design research as a whole. Exceptions to this can be seen in policy research, where aspects of the physical environment were examined (Clement, Harding, et al., 1973; Harding, Clement, and Lammers, 1973; and Wittman, et. al, 1974). This research exemplifies the usefulness of the HEM in describing and developing culturally appropriate structures and spaces.

The basic concepts for this type of information gathering derive from a cognitive anthropology or ethno-semantic tradition examining social phenomena (Harding and Livesay, 1984). Harding (1979) compares the similarity of participatory design concerned with user input (in environmental design research) to the orientation of cognitive anthropology: "The concern is with determining the culturally-defined categories of a domain rather than imposing an investigator-defined set of categories in a situation" (p.3).

The particular organization of the HEM techniques and procedures for data collection and analysis were largely developed by Stefflre (1972; Stefflre, et al., 1971). Futher development of the techniques was partially the result of Policy Research and Planning Group, Inc. contract studies, incorporating a wide range of applications. (See, for example, Clement, Lammers, et. al, 1973; Harding, 1974; Harding, Bakare, and Lammers, et al., 1975; Harding and Boyer, 1976; Harding, Clement, and Lammers 1972a, 1972b, 1973; and Wittman, et. al, 1974.)

Policy Research and Planning Group, Inc. further refined the HEM for the purpose of determining how a new item, a new program, or a new service could be developed and described so that it is culturally appropriate. "Culturally appropriate" is used broadly here to refer to the compatability of an introduced element with the socio-cultural patterns, goals, values, and circumstances (context) characteristic of the populations to which the element is introduced (Harding, 1979).

The HEM is readily adaptable to environmental design research, and provides a strategy for examining privacy regulation in the work environment. Successful adaptation of the HEM is contingent upon a thorough understanding of the method and sharing of its ontology, which guides the method. This safeguards against juxtaposing incompatible concepts in the translation across disciplines. "Translation" is defined here as the concepts of one paradigm redefined in the language of another paradigm (Archea, 1976).

The importance of understanding the method and sharing its ontology should not be underestimated. At the risk of over-simplifying, Gastal's (1982) research demonstrates that translation is counter-productive when the method is misunderstood. Gastal attempted to formulate a procedural model for architectural programming using ethnographic methods that would accommodate participants from heterogeneous backgrounds (i.e., policy makers, design team, and users) during the design process. Contrary to Gastal's argument, his literature review of the historical background of a particular culture does not constitute a true, full ethnography--merely a literature review. Gastal unknowingly illustrates his own confusion: "Anthropological methods tend to be relatively unstructured ...[and] do not have a systematic tradition of methodological endeavor" (p. 18). Anthropology has a research tradition dating back to the 19th century. The rigorous methodological structure of ethnographic methods is discussed by such well-known authors as Denzin (1978); Erickson (1986); Smith and Pohland (1976); and Spradley (1979; 1980).

As stated earlier, Moore, et al. (1984) recommend paradigm-merging as a strategy for theory development. Franck (1987), in a review of recent developments in architectural theory, observes that the utility of positivism and functionalism is being questioned, with an increased interest in "history, culture, myth, and meaning" (p. 65). The HEM offers a viable alternative to the positivist methodological paradigm for theory development in environmental design research, so long as the method is understood and its ontology shared.

Elicitation Procedures

Dr. Joe Harding helped to refine the HEM while president of Policy Research and Planning Group, Inc.. The following discussion of the HEM elicitation procedures draws heavily from Harding's description of policy research conducted at this organization (1974 and 1979; Harding and Livesay, 1984; Nardi and Harding, 1978). The three basic components of the elicitation phases are summarized in Figure 5.

Stage 1--Domain Definition

The Domain Definition is designed to exhaust the range of respondents' perceptions concerning the variables being examined. The language of the respondent is used in a series of interlinked questions. The questions which are asked first identify "items" in the domain. Subsequent questions determine "attributes" of each item in the domain of interest (for example, kinds of privacy regulation) and their attributes (i.e., dimensions, features, traits, and characteristics).

The responses elicited in the Domain Definition are recorded verbatim so that terms and phrases may be used in later elicitation phases. The material is transcribed and content analyzed. Spradley's domain, taxonomic, and componential analyses (1979) and Smith and Pohland's constant comparative method through tentative assertion lists (1976) are examples of empirical methods used in content analysis (i.e., analysis of qualitative data).

Heuristic Elicitation Methodology

	Stage I	Stage II	
Instrument	Domain Definition	Beliefs Elicitation	Preference Rankings
Type of Data	Qualitative	Quantitative	Quantitative
Brief Description	Open-ended interviews in which respondents answer a series of interlinked question which are recorded verbatim to preserve the language and conceptualizations of the respondents.	Structured interviews in which respondents answer yes or no to questions reflecting aspects of the problem of interest expressed in the concept elicitation.	Structured interviews in which respondents rank order, on the basis of their own preferences, items and attributes in the domain of interest.
Type of Data Analysis	Content Analysis	Statistical techniques from frequencies and distributions to multi-dimensional scaling and hierarchical clustering (the latter are optional)	Mean rankings, tests of significance for subgroup differences

Figure 5 "Heuristic Elicitation Methodology" from Nardi and Harding, "Determining Community Attitutes and Preferences for Programs and Services," Carolina Planning Vol. 4 No. 1 (Spring 1978), p. 39

Prior research has demonstrated that a large sample is not necessary for the Domain Definition phase as this kind of in-depth interviewing is designed to discover the range of knowledge and attitudes of respondents about a particular domain (Clement, Lammers, et al., 1973; Harding, 1974; Harding, Clement, and Lammers, 1973a; Harding and Livesay, 1984; Stefflre, 1972). The Domain Definition interviews reveal the range of items and attibutes of a well-defined domain relatively quickly, so long as a heterogeneous sample has been selected.

Stage 2--Beliefs Elicitation

The Beliefs Elicitation is designed to identify beliefs associated with domain items and attributes and to determine interrelationships among them. The actual distribution of beliefs (e.g., attitudes, perceptions) throughout the population is examined during this elicitation phase. Measuring the extensiveness of beliefs within the population requires quantification. The beliefs instrument is constructed in binary matrix form so that it can be statistically analyzed. The Beliefs Matrix, a structured questionnaire, is developed from the Domain Definition responses in language that is familiar to the respondents. The Matrix consists of a set of row by column categories. The categories cross-relate items and attributes via a question that can be responded to by a "yes" or "no." The respondent can be queried on all possible permutations of row by column categories in a relatively short period of time, utilizing the matrix format. A single interview provides an extensive amount of data concerning the respondent's perceived association between items and attributes. A hypothetical example of a Beliefs matrix examining privacy regulation is illustrated in Figure 6.

Aggregated frequencies tabulated from all matrix cells form the basis of quantitative analysis. Quantitative procedures for simple frequency counts and certain correlational analyses typically offer the researcher sufficient information on the extent of cultural agreement among item and attribute relationships. The data are also amenable to analyses using hierarchical clustering and multi-dimensional scaling. Past experience with the Beliefs Elicitation indicates that matrix data tend to stabilize with a sample size of thirty to fifty people.

The matrix data offer a great deal of rich information. It does not, however, provide priority and preference weightings among item and attribute relationships. This type of information is obtained from the final phase of elicitation--ranking.

Preference Ranking

Preference Ranking is designed to determine preferences for domain items and attributes. Priority trade-offs can also be included in the ranking phase. Categories to be ranked are usually a subset of those items and attributes that were included in the Beliefs matrix.

Individual rankings are aggregated and the mean rank calculated for each category. Items and attributes preferred by the majority of the population (or a specific subsegment) are determined through the ranking, as well as those perceived to be undesirable and to be avoided. Harding (1974) describes ranking as the "minimax solution," determining the "alternative preferred by many but greatly disliked by few" (p. 82).

Sample Question: Is X [design feature] important in your work for Y [attribute of work environment]?

Hypothetical Responses

X DESIGN FEATURES	Y ATTRIBUTES OF OFFICE ENV. Acoustical Privacy	Speech Privacy	Visual Privacy	Olfactory Privacy	Physical Comfort	Social Support	Policy Support	Aesthetic Support	Information Flow	Office Hierarchy/Status
Enclosed workstation w/ glass partitions & door										
Enclosed workstation w/ glass partitions & no door										
Enclosed workstation w/solid partitions & door										
Enclosed workstation w/solid partitions & no door										
Workstation w/ no partitions										
Workstation visible to supervisor										
Workstation visible to co-workers										
Plants as dividers between workstations										
Adjustable lighting inside workstation that augments/ impedes visibility to co-workers										
Noise control through sound adsorbent interior finishes, masking of background noise, & proper distances among workstations to support desired sound level										
Indoor air quality that eliminates cigarette smoke										
Seating area for visitors not immediately adjacent to clerical worker										
Comfortable furniture										
Workstation adjacent to co-workers with similar office duties										
Consensus on meaning of workstation as occupant's territory										
Personalization of workstation										
Flexibility in arrangement of workstation										
Room for expansion										
Personal filing space and desk										
Small conference areas										

Figure 6 Beliefs Matrix Examining Privacy Regulation

A sample size larger than previous elicitation phases is recommended for generalizing data that has been ranked. Harding and Livesay (1984) suggest a sample size of at least two-hundred as weightings can vary among and within different segments of the population.

Any elicitation phase of the HEM can be used individually and stand alone as a separate investigation. Harding (1974), however, stresses that, at present, there is greater utility if all phases of a study are completed: "The worth of the elicitation instruments derives from their use as interrelated elements which build on each other to form a firm data base" (p. 13). Harding (1974) suggests that future refinements in the instruments and analyses for specific types of situations (e.g., privacy) may eliminate portions of the method, or replace them with modified instruments that are faster to use.

USEFULNESS OF THE HEM FOR IMPROVING CURRENT PRACTICES AND LIMITS OF PRIVACY RESEARCH

The HEM's strength lies in its ability to establish internal validity--the very component in which privacy research is consistently weak. As a cognitive ethnographic method, the "nature of ethnography makes it potentially quite strong in validity, especially internal validity" (Eisenhart, 1985, p. 19; see also Denzin, 1978).

The short time constraints mandated by corporate culture increase the difficulty of establishing reliability and validity in field settings. Although the HEM is not a device providing immediate answers, it allows for completion of data collection faster than the long-term field work necessary for "true" ethnography, without threatening reliability and validity. Harding and Livesay (1984) contend that the HEM is moving in the direction of allowing "completion of data collection fast enough so that policy recommendations arising out of the research are not irrelevant because decisions had to be made in a short time period" (p. 73).

Failure to expose the personal constructs of the research subjects, the users of the environments examined, is the major limit of privacy research to date. The HEM emphasizes the personal constructs of the user, and does not superimpose categories that have already been established by investigators. The HEM is representative of a growing movement within the social sciences to give credibility to the perspective of the recipient/respondent (Harding and Livesay, 1984).

One of the most distinguishing features of the HEM is that the questions/instruments are developed from the respondent's language elicited in earlier phases. Each successive elicitation phase is built on user responses to a prior one. The HEM stimulus materials are respondent-generated and data respondent-categorized rather than investigator-generated and investigator-categorized. This helps to control for rival factors by decreasing the likelihood of overlooking significant attributes of a domain being examined (Spradley, 1979;1980).

No single method solves the problem of rival factors. To this end, HEM elicitation procedures help triangulate the collection and analysis of qualitative and quantitative data. This also decreases the reliance on statistical inference alone to rule out spuriousness.

Researchers may more confidently assume that they are actually **measuring and observing** what they think they are measuring and observing by employing multiple methods, such as the HEM:

> When a hypothesis can survive the confrontation of a series of complementary methods of testing it contains a validity unattainable by one tested within the more constricted framework of a single method. (Webb, et al., 1966, p. 174)

Empirical analysis of qualitative methods is rarely used to examine aspects of the physical setting in the workplace, including privacy. Physical traces collected from photodocumentation and recorded descriptions of architectural space are rarely empirically analyzed. The HEM employs empirical tools for analyzing qualitative data that are adaptable to environmental design research. As stated earlier, such ethnographic tools include Spradley's domain, taxonomic, and componential analyses (1979) and Smith and Pohland's constant comparative method through tentative assertion lists (1976). Use of these procedures sometimes results in lengthy analyses, since one goal is to become completely saturated in the data in the process of refining and extending theory grounded in data.

Problems with selection and regression due to a nonrepresentative sample and extreme cases can be reduced by a larger sample size that has been randomly selected from a heterogeneous population. Larger sample sizes are used during the latter phases of the HEM in order to examine the distribution of beliefs in the population.

Werner and Schoepfle (1987) argue that the triangulation of qualitative and quantitative methods offers additional insights and breadths. These apply to the Heuristic Elicitation Methodology:

1. Latter phases of elicitation employ a survey questionnaire enabling the researcher to generalize to a larger population. These latter phases are not limited to the smaller sample group examined during the Domain Definition.
2. Quantitative summation of the rich detail provided in the Domain Definition helps to reduce complexity.
3. The triangulation of quantitative and qualitative methods for data collection and analysis increases validity.
4. Alternative classifications are possible through the Beliefs matrix (examining domain, taxonomic, and componential relationships) and through Preference Ranking. An example of this would be where a design feature was judged to be an attribute of visual privacy during the Beliefs Elicitation, but that same feature was not considered to be as important in regulating privacy as another feature during the Preference Ranking.

CONCLUSION

Harding (1974) summarizes the major advantages of the HEM. Applied to privacy research, culturally specific data--both qualitative and quantitative--are obtainable, providing: (a) a fairly definitive interpretation (i.e., understanding) of the structure of the domain of privacy and its cultural regulating mechanisms; and (b) a basis from which to examine the acceptability (to that culture) of new architectural correlates of privacy which might be introduced.

Stokols (1988) points out that there is a potential contradiction between a sole pursuit of technological innovation and questions of human value in environmental design research. Stokols offers a "spiritual orientation" of research holistically encompassing human values and technological innovation as an alternative to other philosophical views. Key components of the spiritual orientation are summarized:

> Research viewed as a communication process that can enhance the awareness, participation, and cohesion of environmental users; as a process for articulating and strengthening the values of participants; [with] equal emphasis given to qualitative and quantitative methods. (p.5)

The Heuristic Elicitation Methodology, guided by an interpretivist philosophy, emphasizes the personal constructs of the user. This serves to enhance awareness, participation, and cohesion for the user as categories are respondent-generated and data respondent-categorized rather than investigator-generated and investigator-categorized. The HEM seeks to understand the subjective and intersubjective meanings of beliefs, attitudes, and values for participants--with equal emphasis given to qualitative and quantitative methods.

CHAPTER V

METHODS

RESEARCH SITE--SOCIAL CONDITIONS OF THE STUDY

The study was conducted at Gulfstream Aerospace Corporation in Savannah, Georgia. Gulfstream is a leading manufacturer of jet powered aircraft for corporate business and government markets. Gulfstream employed approximately 4000 people by 1987. Gulfstream facilities account for over two million square feet of space in three states. There is a production facility in Okalahoma and a facility for Gulfstream's completion services (i.e., interior and exterior finishing of jets) in California, in addition to the Savannah facility. The site plan for the Savannah facility and one of the production areas are displayed in Figure 7 and Photo 1.

The Company's product line began in 1959 in New York, with the development of Gulfstream I. The twin-jet Gulfstream II was introduced in 1966. This large, twin engine propjet powered aircraft was the first of its type and size designed specifically for business use. These corporate jets were the first aircraft capable of carrying fourteen to sixteen passengers and crew for long distances, and were the first to exceed jet airline speeds.

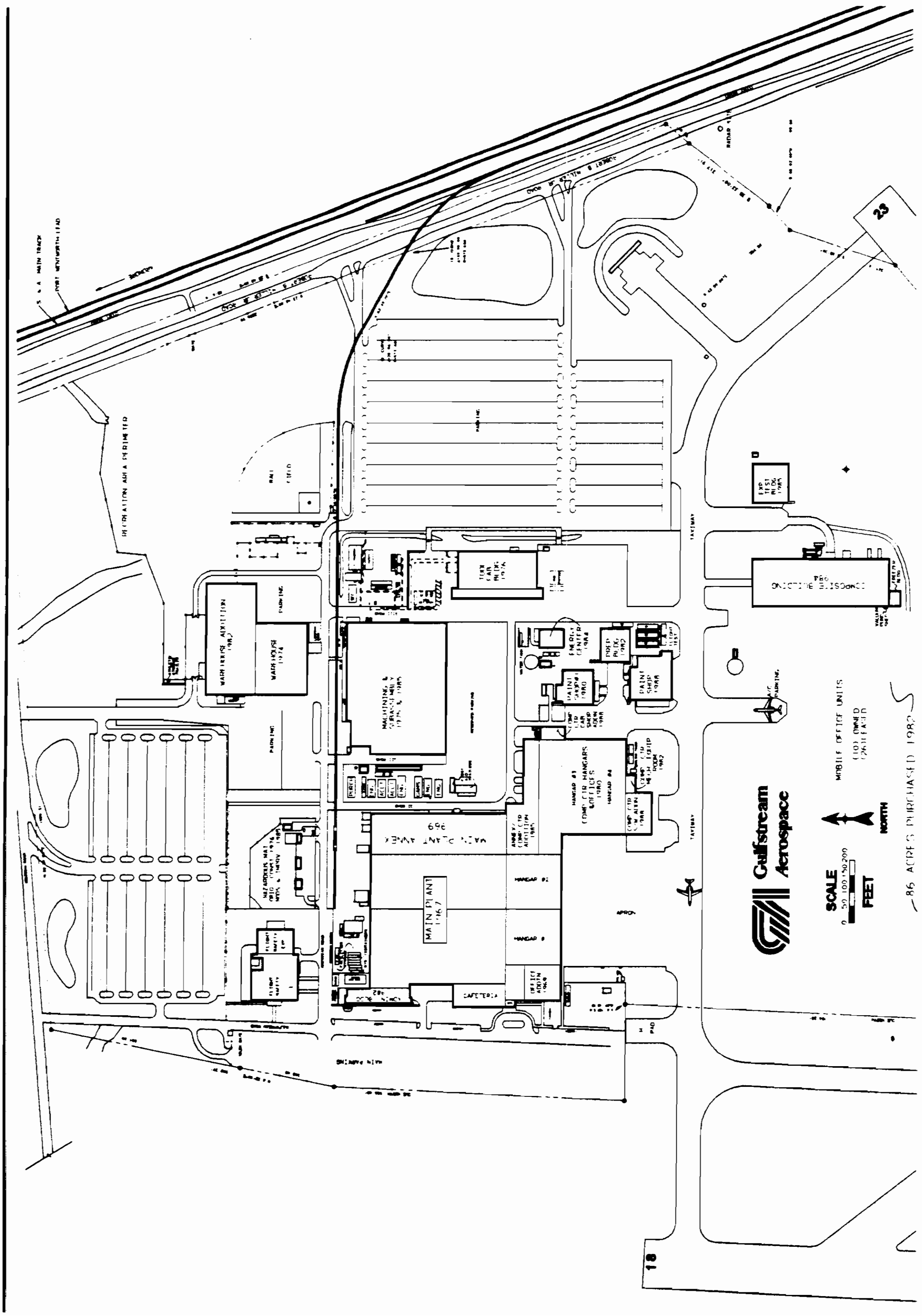

Figure 7 Siteplan for Gulfstream Aerospace Corporation

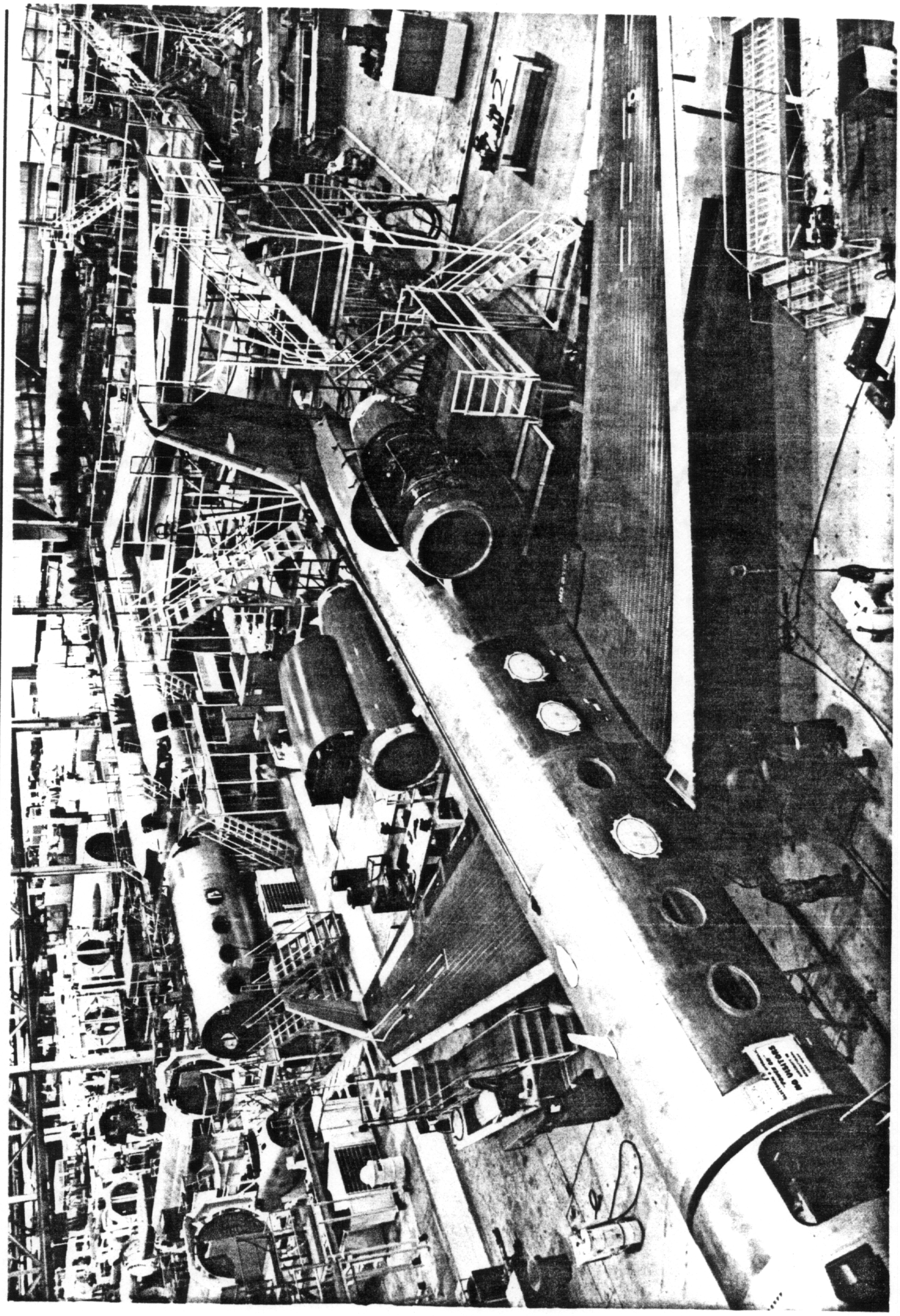

Photo 1 A Production Area at Gulfstream

An assembly plant for the Gulfstream II was established in Savannah, Georgia in 1967. The Savannah plant gradually became a high technology manufacturing operation during the development of Gulfstream III in subsequent years. Gulfstream III was certified in 1980 by the Federal Aviation Administration, and holds records for speed, distance, altitude, and range. Since its founding in 1978, the Savannah facility has grown from an aircraft assembly plant to an completely integrated, 1.1 million square foot manufacturing facility. Gulfstream is currently working on the promotion, marketing, production, and delivery of the latest series of Gulfstream aircraft, the Gulfstream IV; and the development of the high performance Special Requirements Aircraft, the SRA, for world military markets. The SRA design evolved from Gulfstream's business jets. Today there are close to seven hundred Gulfstream business propjets and jets operating throughout the world. Over one-hundred thirty of these aircraft are currently used by thirty governments around the world (Gulfstream Aerospace Corporation, 1990a and 1990b).

Purpose of Study

The purpose of the study is to determine design features that engineers perceive as regulating privacy in two open-plan office environments at Gulfstream: Production Engineering and Manufacturing Engineering. Figures 8 and 9 represent the floorplans for these

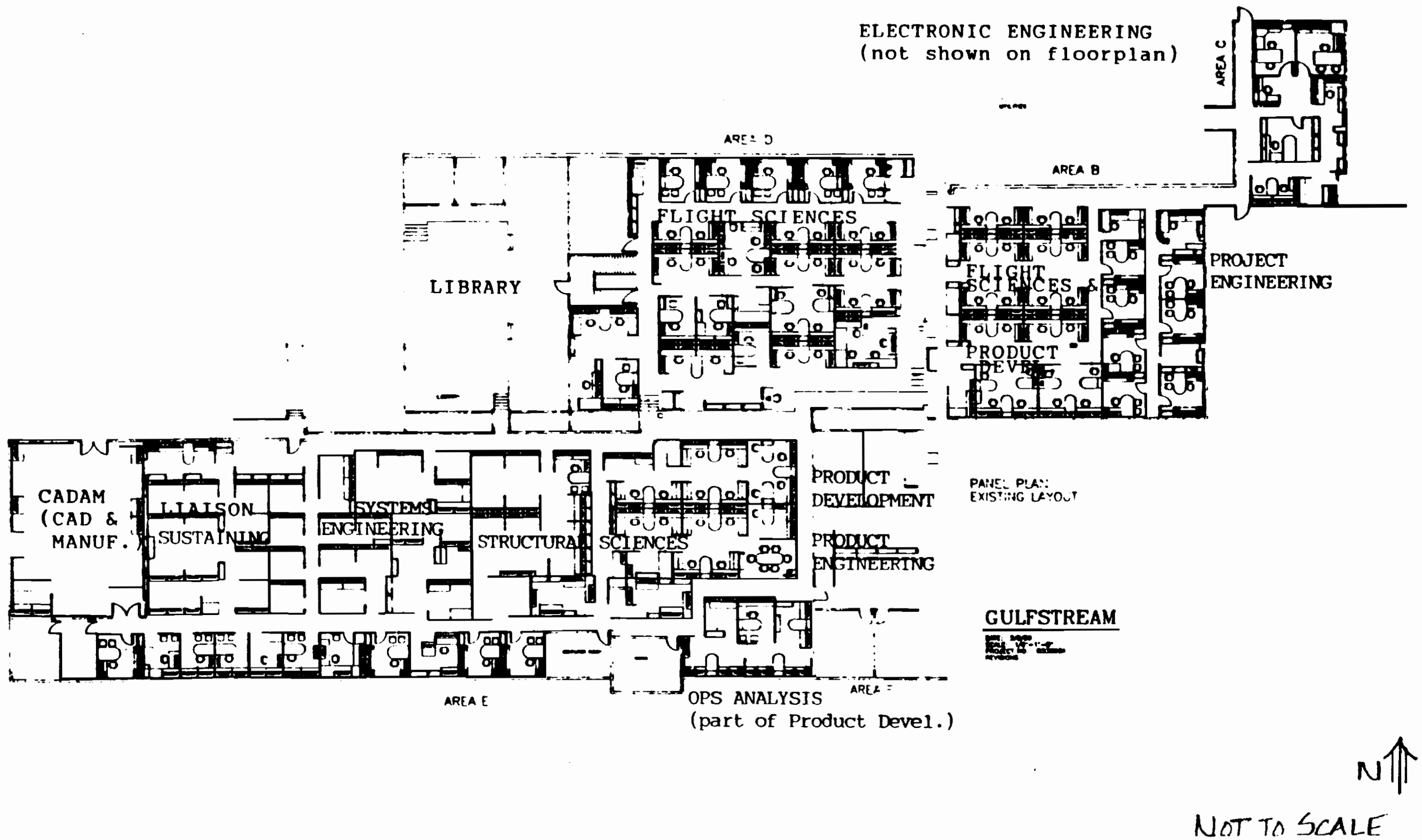

Figure 8 Production Engineering Floorplan

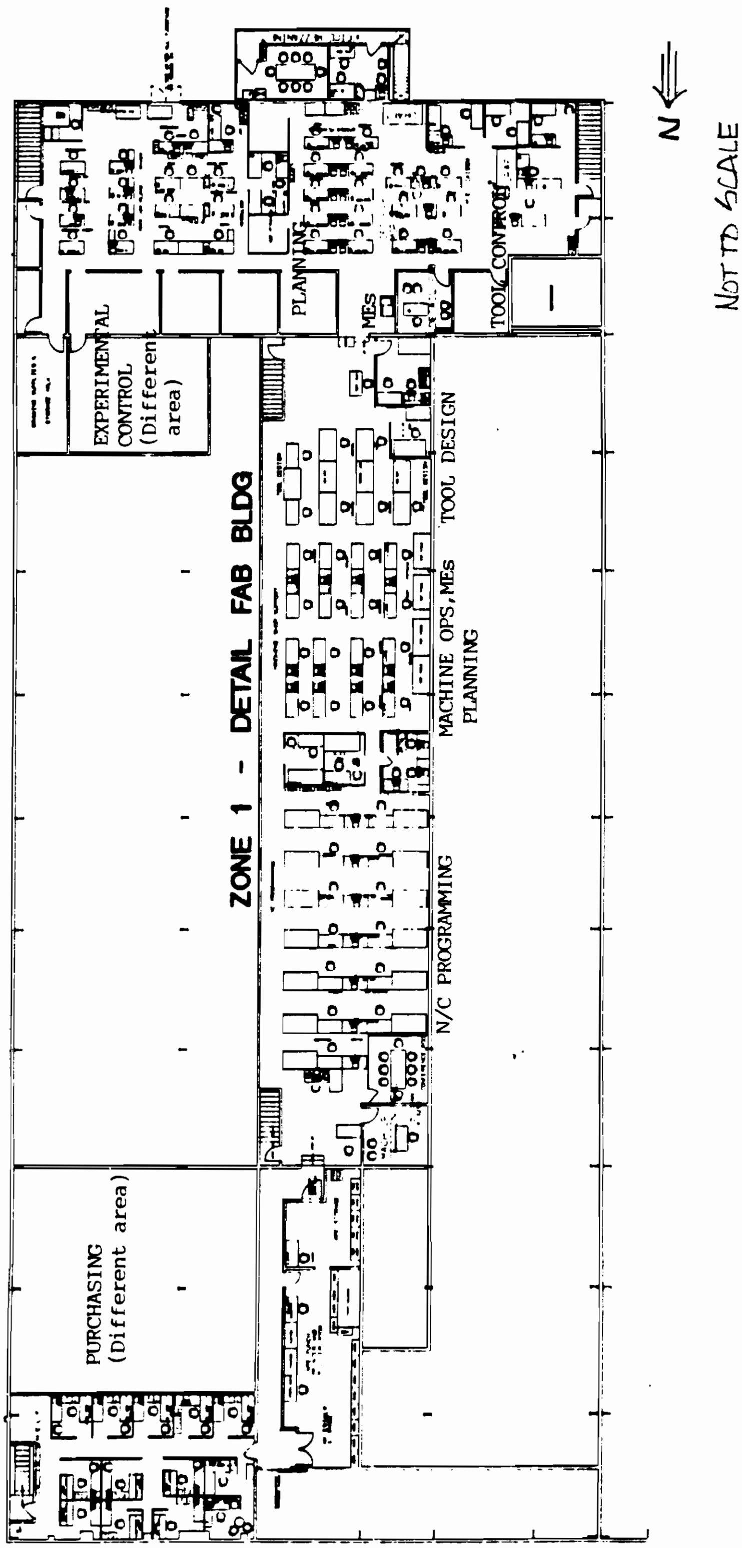

Figure 9 Manufacturing Engineering Floorplan

two open-plan offices. Participants were selected from the group sections identified on the floorplans.

Production Engineering

Production Engineering designs, produces the design drawings, assists in the building of the airplane, and certifies the airplane. There is constant production and development, which means that people within Production Engineering are continually working on different projects.

The interior design and architectural details are indicative of a 1970's approach to open-plan modular layouts, as reflected in Photos 2-5. Production Engineering is an open-plan office with predominantly 62" high and some 80" high modular partitions and ganged furniture (e.g., desks and shelving). The floorplan is laid out due to spatial requirements, and does not reflect information flow between group sections. The 62" high partitions were selected in order for the engineers to stand and have immediate access to co-workers. There is no sound masking (i.e., white noise). There is some personalization of workspaces.

Interior finishes include an acoustical tile ceiling with either recessed or surface-mounted fluorescent fixtures. There are no exterior windows. The different areas have either dark blue or light brown carpet. Structural walls are painted white, with some plywood

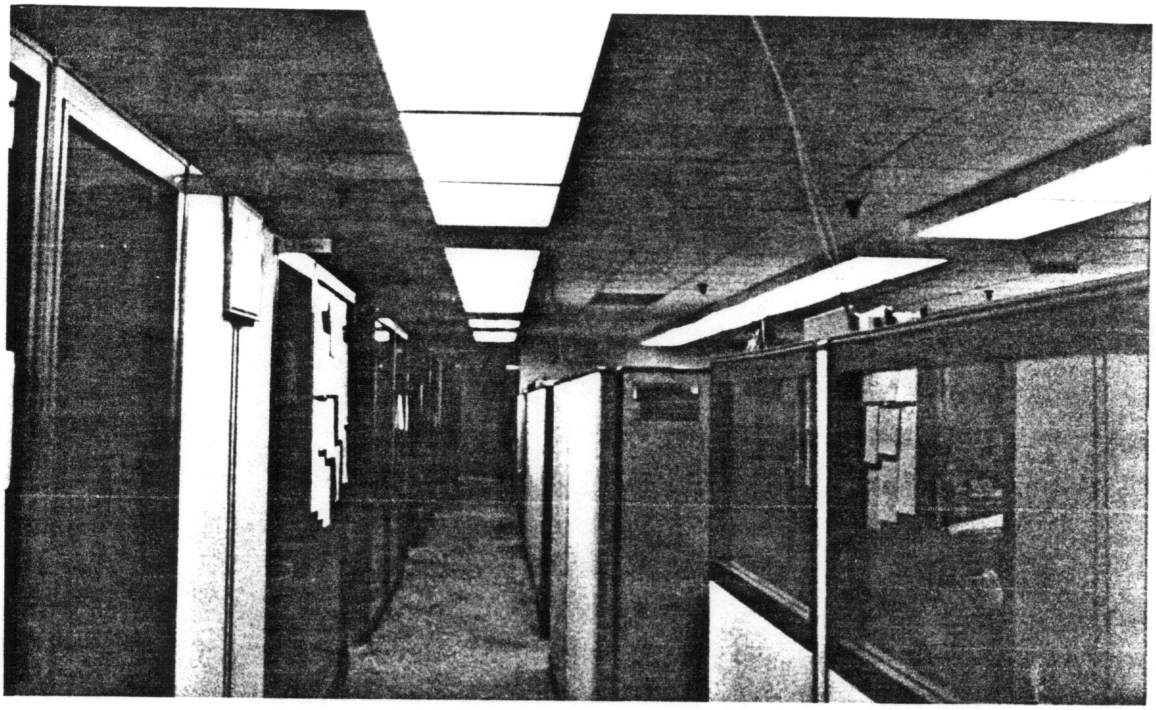

Photo 2 Open-plan Office Layout in Production Engineering

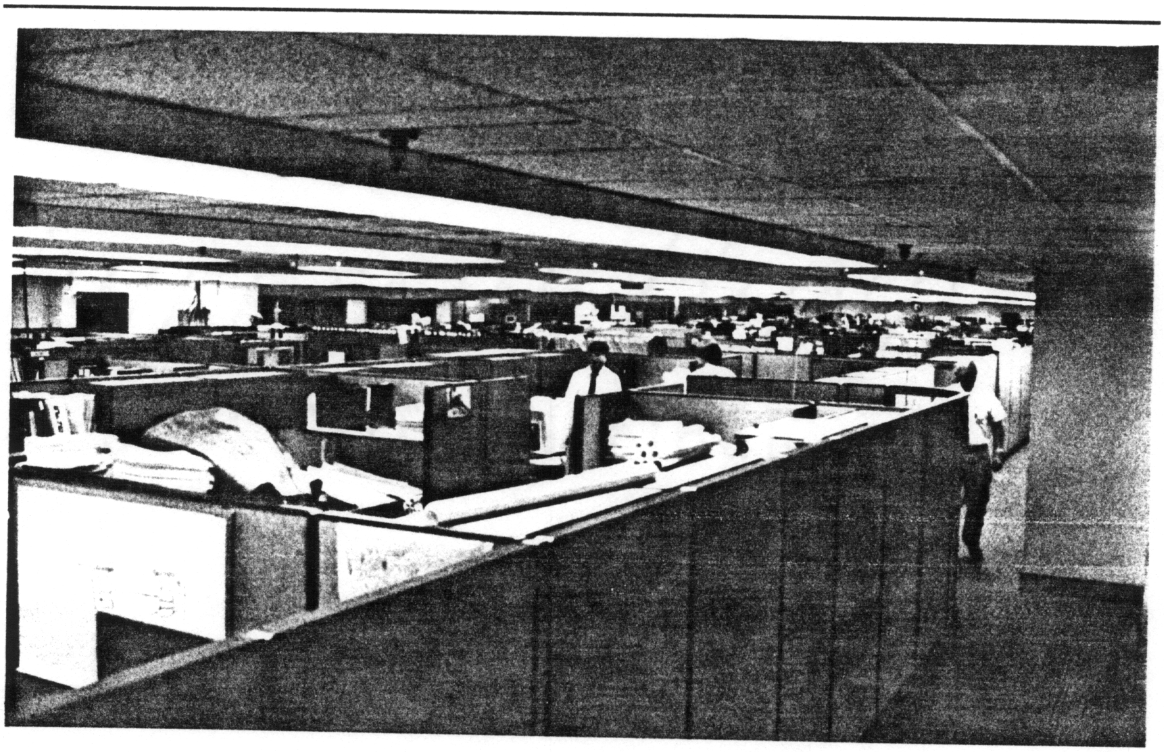

Photo 3 Open-plan Office Layout in Production Engineering

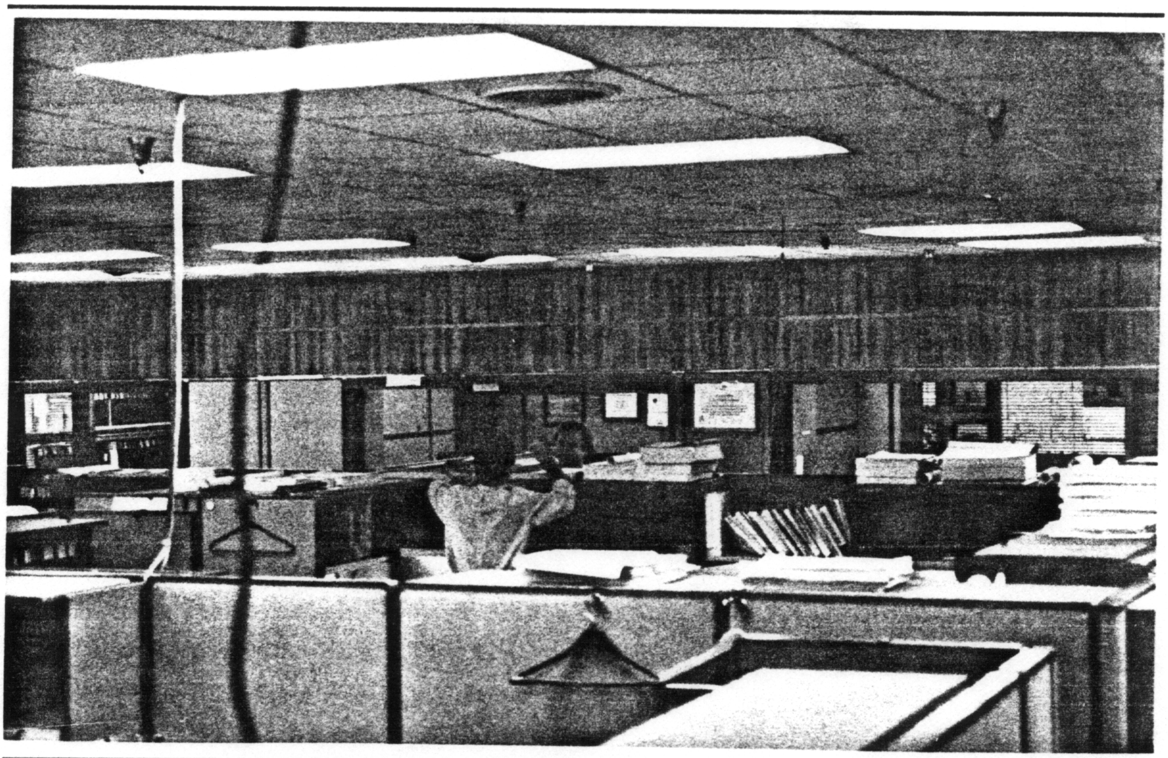

Photo 4 Open-plan Office Layout in Production Engineering

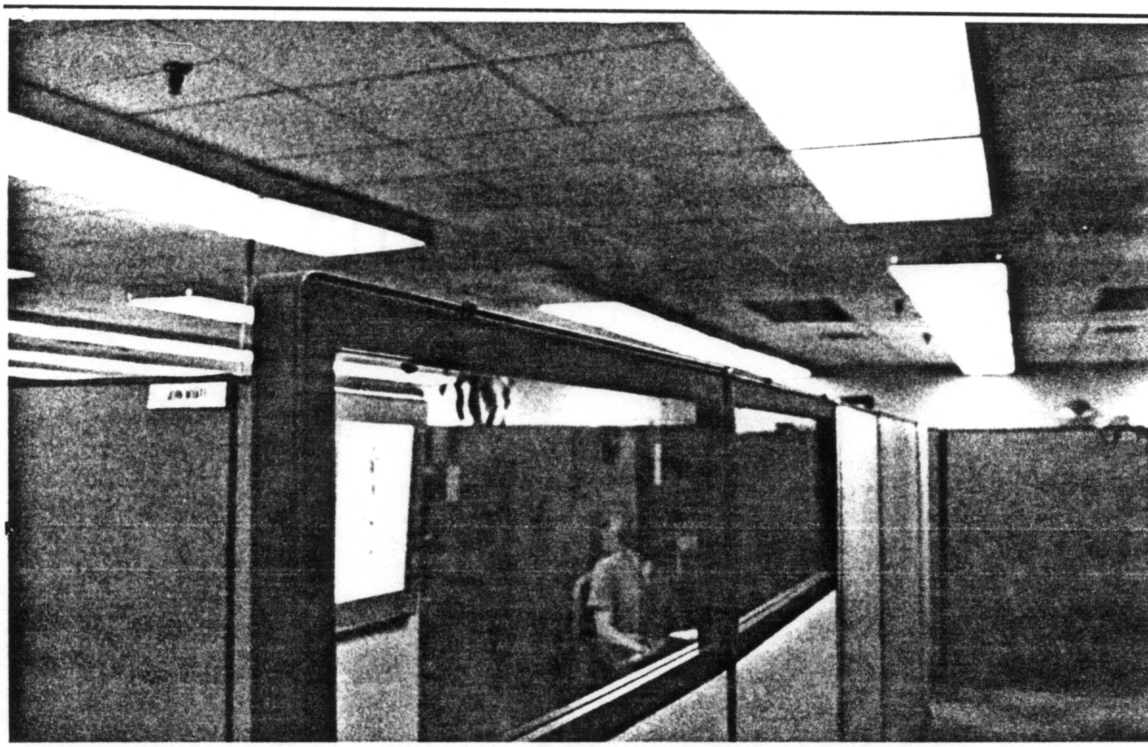

Photo 5 Open-plan Office Layout in Production Engineering

paneling in one of the corridors. The 62" and 80" high partitions are covered in light brown or grey sound-absorbent material, depending on the carpet color. Most of the 62" high partitions are solid, however those with windows typically have paper documents or white marker boards blocking out visual distractions. Most of the 80" high partitions have a window, usually accompanied by blinds, and a door. These are reserved for higher-rank engineers. Enclosed workspaces typically have been laid out to accommodate anywhere from one to four people. Exposed computer cables were observed.

Manufacturing Engineering

Manufacturing Engineering takes the aircraft designs from Production Engineering and produces design drawings that provide the manufacturing information necessary to build the aircraft. Manufacturing Engineering supports manufacturing by supplying the tools and equipment needed to do the job. "Tools" refers to large assembly fixtures and jigs that hold the parts of the airplane in place while the parts are developed.

This open-plan office is predominantly a traditional bull pen arrangement (i.e., no partitions) and is depicted in Photos 6 and 7. There are recessed speakers in the ceiling accommodating a music system, however, it is rarely used. The system was not operating during the investigator's observations. The floorplan is laid out based upon the information flow

Photo 6 Open-plan Office Layout in Manufacturing Engineering

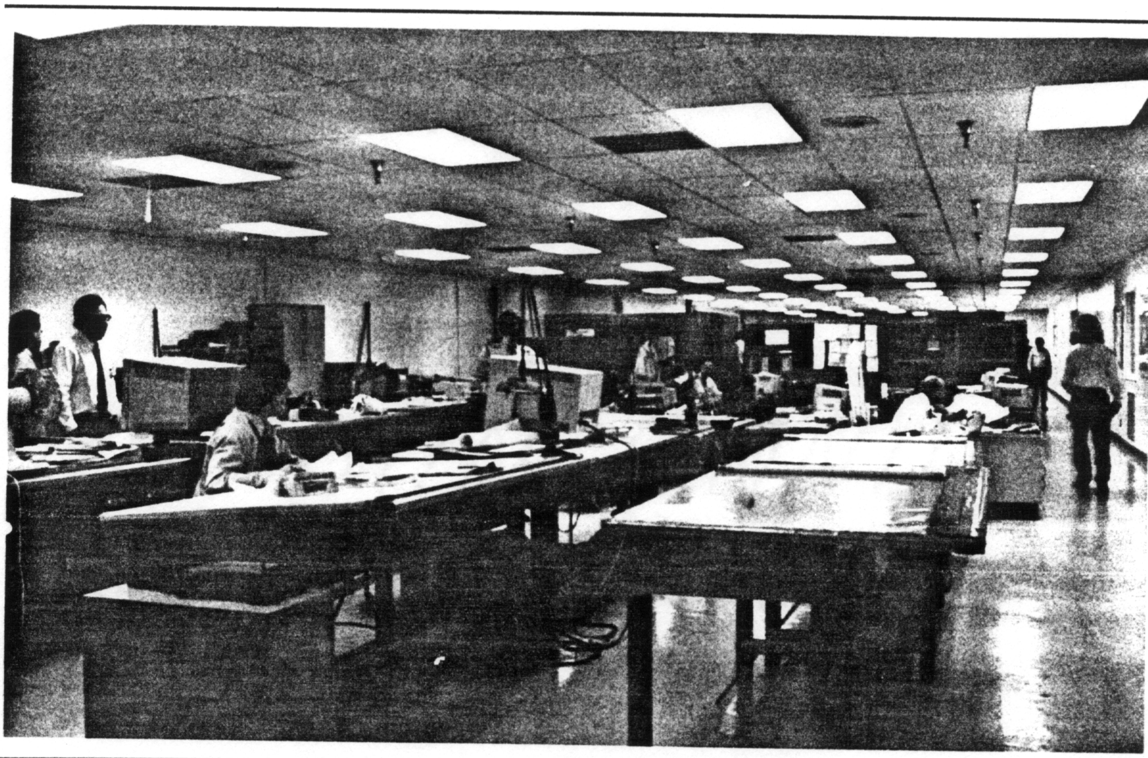

Photo 7 Open-plan Office Layout in Manufacturing Engineering

between group sections. There are no exterior windows, but there are internal windows viewing the Machine Shop below this office. There is minimal personalization of workspaces.

Interior finishes include an acoustical tile ceiling with recessed flourescent fixtures. Structural walls are painted white. Linoleum tile flooring is laid throughout the area. Some workspaces are enclosed in 62" and 80" high partitions. These partitions typically are covered in plywood paneling. The 62" high partitions are centrally located and separate group sections. The 80" high partitions are located along the perimeter of the open-plan office. The partitions usually have a window, but are not equipped with blinds. The 80" high partitions also have a door. These workspaces are reserved for higher-rank engineers and accommodate one person. Exposed computer cables were observed.

METHODS OF DATA COLLECTION AND ANALYSIS

Field observation, photodocumentation, descriptive interviews, a document search, and the Heuristic Elicitation Methodology (HEM) were used to collect data. The rationale for utilizing the HEM and its usefulness for examining privacy regulation in the work environment are discussed in previous chapters.

Prior to utilizing the HEM, non-manipulative direct observation identifying physical traces and behavior that might pertain to privacy issues were recorded using low inference descriptors (see Spradley, 1979); overall office layouts were photographed; descriptive interviews were conducted with several Gulfstream personnel; and a document search was conducted analyzing pertinent floorplans, the site plan, and background information on Gulfstream. The investigator's role was that of a recognized outsider. Unobtrusive field observations and photodocumentation took place over a seven hour period.

Sample

Gulfstream was instructed to select a heterogeneous sample of engineers from each open-plan office, varying specific ranks within a certain range, age, and gender. The investigator did not have access to personnel records, which necessitated Gulfstream making this selection. Gulfstream was instructed to select only U.S. born citizens in order to obtain more culturally-specific data. A thirteen to one ratio of male to female engineers employed in Production Engineering was selected, as there are predominantly male engineers. There are no female engineers currently employed in Manufacturing Engineering, and none are anticipated in the near future. Engineers were selected whose job duties involve both technical skills and some supervisory responsibilities. The range of rank was held constant.

Engineers were selected from similar ranks in each group: Group Head down to Supervisor in Production Engineering; and Supervisor down to Lead Engineer I and II, Planners I and II, Tool Designers I and II, and Numerical Control Programmers I and II in Manufacturing Engineering. There are no standard titles across departments. Only Direct Personnel participated in the study (i.e., under full-time contracts).

Structured interviews were conducted in Stage I of the HEM, the Domain Definition. Twenty-five engineers, twelve engineers from Production Engineering and thirteen from Manufacturing Engineering, participated in April of 1990. A structured questionnaire was administered in Stage II of the HEM. Manufacturing Engineering completed the questionnaire in May and Production Engineering completed it in July. (Production Engineering did not participate until this time due to a reduction in personnel.) Fifty engineers completed the Beliefs Matrix part of the questionnaire, twenty-five from each subgroup. Eighty-nine engineers participated in the Importance Ranking part of the questionnaire, thirty-nine from Production Engineering and fifty from Manufacturing Engineering. Both phases of elicitation had a response rate of 100%. Photo 8 displays the research instruments compiled for distribution to Gulfstream participants.

Photo 8 Beliefs Matrix and Preference Ranking Questionnaire Compiled for Distribution to Gulfstream Participants

Stage I--Domain Definition

Two pilot studies were conducted in March of 1990, examining the Domain Definition. Information elicited from the questions asked during the first pilot study was sometimes too general for facility design and management purposes; specific design features perceived as regulating privacy were not consistently elicited; and some respondents appeared to be confused by the wording in the questions. The Domain Definition was refined and these problems were resolved by the second pilot study.

Dr. Joe Harding, an internationally recognized authority on the HEM, supported the investigator in data gathering for the Domain Definition. A quiet location was selected to conduct the interviews. Interviewees were told that the investigators were studying how to design a better office layout with their input. The recording procedure was explained. Twenty-six hours of structured, open-ended interviews were conducted in approximately one hour allotments. The results from one of the interviews was omitted from the study as the interviewee was not within the required range of rank.

Respondents answered a series of interlinked questions. Their answers were recorded verbatim. A set of questions is presented below, illustrating the nature and format of questions used in the Domain Definition for the study:

Q1. What are the different kinds of things that you do, or try to do, or try to get done in your office? [Answers = "X"]

Q2. For/when "X", what conditions, or office features, or situations make it easier to conduct that activity? [Answers = "Y"]
PROBE What else might make it easier to conduct "X" other than "Y"?

Q3. What conditions, or office features, or situations make it harder to do "X"?

Q4. What kinds of things are important for you to be able to have in your personal work area? [Answers = "X"]
PROBE When, at what times, or in what situations is having "X" important to you? [Answers = "Y"]
PROBE When else, other than "Y", would "X" be important for you to have in your personal work area?

Werner and Schoepfle (1987) recommend certain guidelines for developing open-ended questions. These guidelines were followed in the development of the questions for the study:

1. Salient dimensions of feeling, analysis, or thought were not presupposed. Interviewees were allowed to take whatever direction they wanted to, in their own language, in order to represent what they wanted to say.
2. The questions asked for use through contrast, similarity, uniqueness, and the ideal. The questions did not ask for referential meaning (e.g., "what does privacy mean to you?") as this merely scratches the surface of meanings in symbols people use (see Spradley, 1979).

3. Dichotomous (yes/no) questions were avoided.
4. Neutral questions were asked, striving for clarity. Judgemental questions along with leading questions were avoided.

A content analysis was conducted utilizing Spradley's domain, taxonomic, and componential analysis procedures (1979).

Non-manipulative direct observation and photodocumentation were again conducted over a seven hour period, prior to proceeding to Stage II of the HEM. Salient physical traces and behavior identified in the content analysis were observed and photographed. In addition, "sequence sampling" was conducted in Manufacturing Engineering. Observational sampling decisions help to increase internal validity of comparisons both within and between studies (Altmann, 1974). Sequence sampling examines a specific interaction sequence, from the onset to the termination of the interaction. Each interaction is recorded in terms of "events" (i.e., frequency) or "states" (i.e., duration). In Manufacturing Engineering, visual and acoustical distractions were recorded in terms of the number of times particular subjects looked up as people walked by their desks.

Stage II--Beliefs Matrix/Preference Ranking

A structured questionnaire consisting of the Beliefs Matrix and Preference Ranking was designed based upon the responses elicited during the Domain Definition. The questionnaire reflected the language of the respondents, salient variables mentioned most frequently by the engineers in the Domain Definition, and items of special interest to the investigator. (See Figures 10 and 11.) The participants were given verbal instructions on how to complete each phase of elicitation, repeated again in written instructions.

Beliefs Matrix

Respondents compared seventeen design items to fourteen job activities, answering yes or no to the question, "Is X [design feature] important in your office for/when Y [activity]?" Variables not relating to privacy regulation were included in the matrix in order to measure the extensiveness of beliefs within a population. The list of design items are types of barriers and field characteristics devised or deployed by designers. Certain job activities listed incorporate activities dealing with privacy. Research suggests that occupants experience and judge "noise" differently from "speech privacy" (Sundstrom, 1982, 1985; Vischer, 1985). Both dimensions of acoustical privacy are included in the list of job activities: talking privately on the phone; talking privately in person; evaluating people, written and verbal; and minimizing noise distractions (e.g., environmental background noise). Note that the job activity "concentrating" may be influenced by visual and olfactory privacy, in addition to acoustical privacy.

BELIEFS MATRIX
SURVEY QUESTIONNAIRE

Is X [design feature] important in your office for/when Y [activity]?

Answer 1 (for yes) or 0 (for no)

[X] DESIGN FEATURES	[Y] ACTIVITIES	1. for supervising people (being able to see them)	2. for having little meetings	3. for concentrating	4. for talking privately on the phone	5. for talking privately in person	6. for minimizing interruptions	7. for minimizing noise distractions	8. for minimizing visual distractions	9. for communicating with people that work together	10. for evaluating people, written and verbal	11. when using the computer	12. when using the CADAM scope	13. when reviewing engineering drawings	14. when writing or when drafting design concepts
having a larger office	1.														
having adequate storage space	2.														
having direct pathways instead of the "maze effect"	3.														
having modular furniture and equipment that's easy to rearrange in my cubicle	4.														
having a cubicle height that I can stand up and see over if I'm looking for somebody	5.														
having an adequate worksurface to spread out drawings	6.														
having a workspace with 5'-0" H partitions	7.														
having a workspace with 7'-0" H partitions	8.														
having a workspace with floor-to-ceiling solid walls	9.														
having a door	10.														
having a conference room	11.														
having a partition window with levelor blinds in my cubicle	12.														
having an open area with no cubicles for my people, but having my overall group enclosed in partitions	13.														
having groups that work together located close together	14.														
having minimal traffic routed through my area	15.														
having my workspace located away from the main traffic flow	16.														
having easy access to reference materials	17.														

Figure 10 Beliefs Matrix Questionnaire

IMPORTANCE RANKING
SURVEY QUESTIONNAIRE

IMPORTANCE RANK	ITEM NUMBER ON BACK OF CARD	
1st	____	(most important)
2nd	____	.
3rd	____	.
4th	____	.
5th	____	
6th	____	
7th	____	
8th	____	.
9th	____	.
10th	____	.
11th	____	
12th	____	
13th	____	
14th	____	.
15th	____	.
16th	____	.
17th	____	(least important)

Figure 11 Preference Ranking Questionnaire

The matrix does not specifically address olfactory privacy as no information was elicited on olfactory issues during the Domain Definition. (Olfactory issues may not have been raised by the engineers because the quality of air flow may be sufficient. Gulfstream workers are not allowed to smoke in the office, contributing to the quality of air flow. Additionally, no olfactory differences were observed among group sections in either office environment, nor were differences observed overall between the two office environments.)

Respondents were instructed to read each row item and follow the row across, comparing the row item with each column item. Upon completion, respondents were told to go the next row item and repeat this process. Each respondent, upon completing the matrix, in effect answered two-hundred and thirty-eight questions concerning his/her perceptions of what job activities are associated with each design feature. Respondents took approximately twenty minutes to complete the matrix. Design items and job activities deemed less critical to the success of the study were placed toward the beginning and the end of the matrix in order to avoid possible problems with "orientation," and "fatigue" in respondents' answers. It is unlikely, however, that "fatigue," at least, would be of much consequence in such a short interview.

Simple frequency counts and distributions for aggregated cells, rows, and columns were tabulated and the probability of association between design items and job activities was calculated using the binomial distribution.

Preference Ranking

Respondents rank ordered the seventeen design features listed in the matrix in terms of their importance to the respondents. Respondents were given a deck of cards, randomly shuffled, listing the design items. Repondents were instructed to separate the deck of cards into three piles. The first pile was to consist of "most important" design items, the second pile to consist of "somewhat important" design items, and the third pile to consist of "least important" design items. Respondents were then instructed to rank order each pile, placing the card with the design item designated most important on top of each pile, followed by the card with the design item designated next most important, etc.. The respondents were told to merge the three piles, now rank ordered from most to least important. The respondents were then instructed to turn each card over, beginning with the top card, and write the numbers listed on the backs of the cards on the Preference Ranking questionnaire in order from most to least important. Respondents took approximately ten minutes to complete the preference ranking.

The mean rank for each design item was computed per subgroup and an independent t-test for each design item was calculated in order to determine subgroup differences between Production engineers and Manufacturing engineers.

CONCLUSION

The materials and methods utilized in the study link different types of data collection and analysis. Useful data and insight were obtained concerning environmental, social, and behavioral mechanisms regulating privacy, the relative importance of design features associated with privacy regulation, and subgroup differences. These results are discussed in the next chapter.

CHAPTER VI

RESULTS

The theoretical construct for this study holds that social, behavioral, and environmental mechanisms operating within the context of culture are employed to regulate privacy within work environments. Figure 1, presented in the "Introduction," represents the model for this conceptual framework and guided the identification of folk terms relating to privacy regulation in the content analysis. The domain, taxonomic, and componential analyses substantiate the regulatory mechanisms classified in the model and are presented in this chapter.

Three hypotheses evolved from major variables elicited during the Domain Definition and identified through content analysis:

(1) Design features associated with privacy regulation in work environments are more important to the user than design features not associated with such privacy regulation.

Literature examining positive and negative effects of the physical setting in the workplace suggests that privacy is important to the user in work environments. The Domain Definition and content analysis indicated that psychological and architectural privacy are very important to the user in work environments.

(2) Barriers and field characteristics associated with privacy regulation in work environments are equally important to the user..

Literature on privacy regulation, as stated previously, indicates that privacy is most consistently regulated through physical enclosure of the work space by walls or partitions. The Domain Definition and content analysis revealed that barriers (such as partitions and doors) and field characteristics (such as orientation or position in space) may be equally important in regulating privacy.

(3) The acoustical property associated with a wall or partition is perceived by the user as more important in regulating privacy in work environments than the visual property associated with the height of a wall or partition.

The research of Sundstrom, Town, Brown, et al. (1980) reveals that workers across ranks gain their greatest perceived privacy in individual offices enclosed by floor-to-ceiling walls or partitions and accompanied by doors. Certain inconsistencies discovered during the Domain Definition and identified through content analysis question these findings. Gulfstream engineers, particularly in Manufacturing Engineering, seemed to prefer the 5′-0" and 7′-0" high partitions rather than the floor-to-ceiling solid walls; having a door did not appear to be an important issue.

The engineers appeared to perceive the acoustical property associated with the partition as more important in regulating privacy than the particular height of the partition, a visual property.

STAGE I--DOMAIN DEFINITION

A content analysis was conducted for the Domain Definition utilizing Spradley's domain, taxonomic, and componential analyses in order to determine folk terms (i.e., symbols) in each domain, subsets of symbols, and relationships among the symbols in these subsets (1979). A system of cultural meanings that Gulfstream engineers use to denote and connote privacy was uncovered. Spradley defines denotative meaning as the "things words refer to" (i.e., referential meaning) and connotative meaning as the "suggestive significance of symbols, over and above their referential meaning" (p.96). The taxonomic and componential analyses result in a descriptive system of social, behavioral, and environmental mechanisms operating within the context of culture that are employed to regulate privacy at Gulfstream.

Domain Analysis

The domain analysis searches for larger units of cultural knowledge. A general understanding of the way Gulfstream engineers perceive their social and physical environments, as a whole, was gained. Results of the domain analysis for Production Engineering and Manufacturing Engineering are presented in Appendices A and B. Data were recorded verbatim.

A cover term, included terms, and a semantic relationship were selected for each domain. Semantic relationships were organized through strict inclusion (X is a kind of Y), cause-effect (X is a way to Y), and attribution (X is an attribute or part of Y). A domain, as previously stated, is a set of categories organized on the basis of a single semantic relationship. Cover terms represent categories of cultural knowledge. Included terms are folk terms that belong to a specific category of knowledge named by the cover term. A cover term is linked to all included terms in its set and is referred to as a semantic relationship (Spradley, 1979).

Taxonomic Analysis

Domains relating to privacy regulation were then analyzed in-depth through taxonomic and componential analyses. Spradley (1979) explains:

> But because time and resources are limited, most ethnographers agree that an exhaustive study of an entire culture will never be accomplished. In actual practice, most ethnographers adopt a compromise: they study a few domains in depth, while still attempting to gain a surface understanding of a culture or cultural scene as a whole. (p. 134)

Taxonomies were constructed for domains relating to privacy issues in order to discover the way the domains are internally organized. A taxonomy identifies subsets of folk terms and the way these subsets are related to the domain as a whole (Spradley, 1979). Tables 4a-7 display taxonomic comparisons between Production Engineering and Manufacturing Engineering for social, behavioral, and environmental mechanisms perceived to regulate privacy. Data were recorded verbatim.

Tables 4a-c identify ways to regulate privacy through barriers devised or deployed by designers. Tables 5a-c identify ways to regulate privacy through field characteristics devised or deployed by designers. Note that the included terms for "position in space," in Table 5b, are listed under the domain "kinds of preferred cubicle location" rather than under "ways to regulate privacy through environmental mechanisms" in the domain analysis. The number of included terms under the latter domain is fairly lengthy in the domain analysis. The separate domain was selected to facilitate the project presentation to Gulfstream, enabling the company to assimilate the data easier. Table 6 identifies ways to regulate privacy through policy and social supports governed by Gulfstream, the cultural institution. Table 7 identifies ways to regulate privacy through overt and cognitive behaviors devised or displayed by the user.

Table 4a Taxonomic Comparison of Ways to Regulate Privacy through Barriers Devised or Deployed by Designers

TAXONOMY OF WAYS TO REGULATE
PRIVACY THROUGH ENVIRONMENTAL MECHANISMS

PHYSICAL ELEMENTS: BARRIERS

(a) WALLS

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Walls	
1. would want something, maybe a wall in front of my desk--something to help me in my concentration, to keep down the distractions--they also come in handy for putting up blueprints, the largest drawings we would have would be about 6' long	1. privacy--doors, walls, an isolated area
	2. private office--floor-to-ceiling walls and door for concentration
	3. own private office [with] floor-to-ceiling walls and door
	4. at minimum possibly four walls with door of some type, at least for Section Head or above
	5. higher walls--full walls
	6. floor-to-ceiling solid wall with door
	7. wish had floor-to-ceiling walls
	8. floor-to-ceiling walls because I deal with personnel
	9. walls floor-to-ceiling
	10. all walls should be to the ceiling
Ceiling	
1. AC [ceiling] panels have helped a little with the noise	[none elicited]
2. ceiling staggered [environment at former employment], evidently they had something in mind, it helped deaden the noise	
Floors	
1. carpeting	[none elicited]
2. carpeted floor	
3. for one thing, carpeted to cut down on the noise level	

Table 4b Taxonomic Comparison of Ways to Regulate Privacy through Barriers Devised or Deployed by Designers (continued)

TAXONOMY OF WAYS TO REGULATE
PRIVACY THROUGH ENVIRONMENTAL MECHANISMS

PHYSICAL ELEMENTS: BARRIERS (continued)

(b) SCREENS

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Partitions	
1. Partitions, when you wanted to talk to somebody you could, but when you need some privacy to think things out, you could	1. due to partitions and sound proofing, it's private enough
2. [my office with partitions is] quieter than outside my office	2. alot quieter with modular panels
3. some sort of noise-deadening dividers--there's no doubt about it, planning these parts is a complicated process, people's lives depend on how [well] we do this job	
Partition Height	
1. cubicles, less than 80", no window, no door	1. opposed to a completely open [office], I liked the partitions [5'H]--[They] cushion enough sound so you can concentrate
2. partitions at 5'[high]--if you could stand up and see, or a higher wall with a window to see out of	2. 80" H partitions with glass panels, sometimes close [them]
3. partitions about 5'H because I could see over the top to see if someone was there or not [environment at former employment]	3. 80" H partitions--with 5'H, people look over and shoot the breeze
4. cubicle layout [62" H that I] could stand up and see over them	4. prefer floor-to-ceiling partitions
5. either kind [62" H or 80" H], the kind you could look over or the latter	
6. 5'H [cubicle]--you could sit down and not see anybody walk by, also, you could stand up if you're looking for somebody in particular you could see them	
7. conference room height partitions [80"H]	

Table 4c Taxonomic Comparison of Ways to Regulate Privacy through Barriers Devised or Deployed by Designers (continued)

TAXONOMY OF WAYS TO REGULATE
PRIVACY THROUGH ENVIRONMENTAL MECHANISMS

PHYSICAL ELEMENTS: BARRIERS (continued)

(b) SCREENS (continued)

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Door	
1. no door 2. closed door	1. solid wall with a door 2. door 3. it would have a door
Window	
1. no window 2. higher wall [than 5'] with window to see out of	1. window control with levelor blinds 2. clear partitions with blinds 3. window allows me to see you, provides a warning system
(c) OBJECTS	
Furniture	
1. [having a large table where respondent can spread out drawings] is important 90% of the time--planning being my basic job function--I think [personal work area] should be spacious enough where you have room for everything--if I have to stop and page through the drawing, it breaks my concentration and doesn't do much for the man beside me	1. a carroll for anybody to get away from the phone [and] their work area
Equipment	
1. put phone on phone mail	[none elicited]
(d) SYMBOLS	
[none elicited]	[none elicited]

Table 5a Taxonomic Comparison of Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers

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TAXONOMY OF WAYS TO REGULATE
PRIVACY THROUGH ENVIRONMENTAL MECHANISMS

PHYSICAL ELEMENTS: FIELD CHARACTERISTICS

(a) SHAPE

Form of Enclosure

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
1. cubicles for everybody would cut down on the socializing and get us more work-oriented, probably	1. cubicles with partitions affords some privacy to conduct your business
2. cubicles or partitions would help a lot, because we could hear over the phone better	2. individualized environments
3. too open--it would be better if we had cubicles, we could concentrate more--wouldn't be as disturbed by people walking	3. in Stress area it's open, but the way it's layed out you have an illusion of isolation or privacy
4. [cubicle] privacy--enough to cut me off from the noise	4. [to be] in enclosure without other disturbances
5. individual cubicles, but large enough to hang drawings	5. my own private office
7. cubicle, also another advantage to that [having cubicle] is the wall space to put drawings on	6. my private office, not sitting next to a guy who's going to hear my conversation
8. [in the ideal general office area] each individual to have his own private cubicle and this be separated in some manner by any other departments	7. almost every engineer had their own office
9. cubicle, two people at most, everyone to be in cubicles for the general traffic to be routed so as not to disturb everybody	8. how space is laid out, certain design elements in a corner location, so just can't walk in without me noticing
10. office-like [ideal personal work area], would have a cubicle, desk-like work area to spread out drawings 4'-12' long--I mostly deal with 12' long [drawings], just as long as it's quiet	
11. enclosed cubicles would be more private [ideal general office area]	
12. everybody likes to have an area that's theirs, a kind of home away from home to figure things out	

Table 5b Taxonomic Comparison of Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers (continued)

TAXONOMY OF WAYS TO REGULATE PRIVACY THROUGH ENVIRONMENTAL MECHANISMS

PHYSICAL ELEMENTS: FIELD CHARACTERISTICS (continued)

(b) SIZE

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Square Footage	
1. it's nice that there's room in front of me, so if I need to concentrate on something, there's nothing in front of me to distract me	1. room [enough] for little meetings
2. [personal work area] should be spacious enough where you have room for everything	2. easy to carry on a conversation, the place next to me is empty, otherwise it would be a disadvantage
3. two people at most, everyone to be in cubicles	

(c) ORIENTATION

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Position in Space	
1. general traffic to be routed so as not to disturb everybody	1. traffic has not been routed through my area [Stress area], adding to that privacy illusion
2. enclosed area away from main traffic	2. not too much traffic
3. [I can] see what's going on around me in that big open room	3. I like being in this row-- not a real high traffic area
4. open space not restricted	4. location [of office] on perimeter, able to achieve some acoustical privacy this way
5. not to be located on main aisle	5. not in the mainstream [cubicle], I will not be interrupted that much
6. it would not have a coffee machine nearby	6. away from mainstream, but I don't elude the telephone
7. I like it [general office area] because it's away from management-- directors, managers, stuff like that-- [creates] relaxed atmosphere	

Table 5c Taxonomic Comparison of Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers (continued)

TAXONOMY OF WAYS TO REGULATE PRIVACY THROUGH ENVIRONMENTAL MECHANISMS

PHYSICAL ELEMENTS: FIELD CHARACTERISTICS (continued)

(d) ENVIRONMENTAL CONDITIONS

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Loudness	
1. liked the white noise [environment at former employment]--it was interesting how it was able to keep the noise transference from other parts of the office--we had 600-700 people in our office with open partitions, but when you stepped inside it you couldn't hear a single word	1. in a management job, more soundproof
2. it [ideal personal work area] wouldn't have a musaic system--it's distracting for me--first thing you know I'm listening to this song and then [I] can't get it out of my head	

Table 6 Taxonomic Comparison of Ways to Regulate Privacy through Policy and Social Supports Governed by the Cultural Institution

TAXONOMY OF WAYS TO REGULATE
PRIVACY THROUGH SOCIAL MECHANISMS

(a) POLICY SUPPORTS

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Formal	
1. open door policy, anyone can come in when they want to--[they] don't have to go through the chain of command [as a supervisor] being of a nature that [I] can be interrupted when things are being prepared--the nature of the work has to allow this	1. open door policy 2. other than that [privacy needs], you should have an open door policy--not be locked up
Informal	
1. use back-up person if I am talking to someone to answer phone and phone mail or fill out time cards 2. also [backup person] will be used to screen those people that want to see me	1. it would be at your discretion [to keep door open/closed] under [management] supervison

(b) SOCIAL SUPPORTS

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Informal Social Norms	
[none elicited]	1. secretary thinks nothing of of interrupting those in cubicle with glass [boss's office] if she doesn't like you 2. they recognize that this is your space [Stress area]-- implied manners not to talk too loudly 3. closing the door to let people know I don't want interruptions 4. closing the door to let people know I don't want to be disturbed

Table 7 Taxonomic Comparison of Ways to Regulate Privacy through Cognitive and Overt Behaviors Devised or Displayed by the User to Regulate Privacy

TAXONOMY OF WAYS TO REGULATE PRIVACY THROUGH BEHAVIORAL MECHANISMS

(a) COGNITIVE

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Environmental Screening	
1. [I] find that if I have an awful lot to do that requires a lot of thinking, I have to shut my mind	[none elicited]

(b) OVERT

MANUFACTURING ENGINEERING	PRODUCTION ENGINEERING
Verbal/Nonverbal	
[none elicited]	1. with real sensitive calls, [you] may have to lower your voice--our job doesn't require too many sensitive phone calls 2. only sharing aisle area [in cubicle], you're much less prone to hear conversations or be interrupted as [your] back is to them--visual cues are a very big part of it
Verbal/Nonverbal ⟷ Territoriality Environmental Mechanisms	
1. with confidential conversations, [I] try to set up a meeting directly, say with supervisor, so people won't overhear [have meeting in supervisor's office] 2. that door that's closed [so] no interruptions--[I] try to find a place like a conference room [during private communication]	1. go to conference room for confidential talks 2. if I have to [do] scheduling of work or evaluations, I go to the library where it's quiet and no interruptions 3. verbal [evaluations of people], try to find a more private area 4. can modify some visuals with blinds, but I don't usually bother because [there's] no door

Componential Analysis

Paradigms were constructed for contrast sets relating to privacy issues. Dimensions of contrast were identified which have binary values (i.e., two parts). Componential analysis is a means to search for constrasts among folk terms in a domain, sort them out, group some together as dimensions of contrast, and enter all this information onto a paradigm. The concept of paradigm is utilized here as it was originally used in linguistic analysis, and not in the broader sense of "world view" popularized by Thomas Kuhn (1970). (See Spradley, 1979.)

Tables 8a-11 display componential comparisons between Production Engineering and Manufacturing Engineering for social, behavioral, and environmental mechanisms percieved to regulate privacy. Data were summarized or recorded verbatim. Tables 8a-c constrast ways to regulate privacy through barriers devised or deployed by designers. Tables 9a-d contrast ways to regulate privacy through field characteristics devised or deployed by designers. Tables 10a-b contrast ways to regulate privacy through social and policy supports governed by Gulfstream. Table 11 contrasts ways to regulate privacy through overt and cognitive behaviors devised or displayed by the user.

Table 8a Paradigm for Ways to Regulate Privacy through Barriers Devised or Deployed by Designers

DIMENSIONS OF CONTRAST

WALLS

CONTRAST SET	Type		Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Walls	wall in front of desk	concentration to keep down distractions to deal with personnel	putting up blueprints		
PROD. ENG.		floor-to-ceiling walls floor-to-ceiling solid wall walls should be to the ceiling at minimum four walls walls higher walls--full walls				
MANUF. ENG.	Ceiling	acoustical tile panels ceiling staggered			helped a little with the noise helped deaden the noise	
PROD. ENG.						
MANUF. ENG.	Floors	carpeting carpeted floor carpeted	to cut down on noise level			
PROD. ENG.						

Table 8b Paradigm for Ways to Regulate Privacy through Barriers Devised or Deployed by Designers (continued)

DIMENSIONS OF CONTRAST

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
		WALLS				
MANUF. ENG.	Parti- tions	noise-deadening dividers less than 80" H 62" H or 80" H conference room height parti- tions 5'H or a higher wall w/ window 5'H	having the option to talk to somebody when needing privacy to help with planning parts, a complicated process not to look over not to see anybody walk by	to look over could stand up and see over or see through window could stand up and see over if looking for somebody	quieter than outside the office people's lives depend on how well job is done	
PROD. ENG.		5'H 80" H with glass panels 80" H floor-to ceiling partitions	sound proofing cushion enough sound to concentrate		private enough a lot quieter	with 5'H, people look over and shoot the breeze
		SCREENS				
MANUF. ENG.	Doors	no door closed door				
PROD. ENG.		door				
MANUF. ENG.	Window	no window window to see out of				
PROD. ENG.		window control with levelor blinds clear partitions with blinds	provides a warning system			

Table 8c Paradigm for Ways to Regulate Privacy through Barriers Devised or Deployed by Designers (continued)

DIMENSIONS OF CONTRAST

OBJECTS

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Furniture	large table	planning			w/out large table, person has to page through drawing, breaking concentration and doesn't do much for adj. person
PROD. ENG.		carroll	to get away from phone and work area			
MANUF. ENG.	Equipment	phone on phone mail				
PROD. ENG.	[none elicited]					

SYMBOLS

MANUF. ENG.	[none elicited]					
PROD. ENG.	[none elicited]					

Table 9a Paradigm for Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers (continued)

DIMENSIONS OF CONTRAST

SHAPE

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Form of enclosure	cubicles individual cubicles cubicle private cubicle cubicle, two people at most enclosed cubicles an area that's theirs	could hear over phone better could concentrate more wouldn't be as disturbed by people walking [cubicle] privacy --enough to be cut off from the noise general traffic routed around cubicles so as not to disturb everybody would be more private a kind of home away from home to figure things out	large enough to hang drawings wall space to put drawings	cut down on socializing and would be more work-oriented, probably separation from other departments	
PROD. ENG.		cubicles with partitions individualized environments enclosure without other disturbances private office corner location of space	affords some privacy to conduct business conversations are not heard by an adjacent person cannot walk in without being noticed		Stress area's layout creates illusion of isolation or privacy	

Table 9b Paradigm for Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers (continued)

DIMENSIONS OF CONTRAST

SIZE

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Square Footage	enough room in front of person spacious enough with room for everything spacious enough for two people at most	to concentrate		with nothing in front of person, there are no distractions	
PROD. ENG.		room [enough] for little meetings	with adjacent place empty, easy to carry on a conversation			

Table 9c Paradigm for Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers (continued)

DIMENSIONS OF CONTRAST

ORIENTATION

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Position in Space	general traffic routed so it does not disturb everybody enclosed area away from main traffic open space not restricted not be located on main aisle no coffee machines located nearby located away from upper management		in a big, open room can see what's going on	relaxed atmosphere	
PROD. ENG.		traffic not routed through Stress area not too much traffic not a real high traffic area in person's row location [of office] on perimeter not in mainstream away from mainstream	not interrupted that much		adds to privacy illusion able to achieve some acoustical privacy	don't elude telephone

Table 9d Paradigm for Ways to Regulate Privacy through Field Characteristics Devised or Deployed by Designers (continued)

DIMENSIONS OF CONTRAST

ENVIRONMENTAL CONDITIONS

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Loudness	white noise at former employment no musaic system	able to keep noise transference from other parts of office		couldn't hear a single word even with open partitions	with musaic system, it is dis- tracting-- person listening to song can't get song out of his head
PROD. ENG.		in a management job, more soundproof				

Table 10a Paradigm for Ways to Regulate Privacy through Policy and Social Supports Governed by the Cultural Institution

DIMENSIONS OF CONTRAST

POLICY SUPPORTS

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Formal	open door policy don't have to go through chain of command supervisor's job allows for interruptions				
PROD. ENG.		open door policy	other than privacy needs, there should be open door policy not to be locked up			
MANUF. ENG.	Informal	back-up person is used to answer phone when supervisor is talking to someone or filling out time cards phone mail is used back-up person is used to screen people that want to see supervisor				
PROD. ENG.		it would be at person's discretion to keep door open/closed under management supervision				

Table 10b Paradigm for Ways to Regulate Privacy through Policy and Social Supports Governed by the Cultural Institution (continued)

DIMENSIONS OF CONTRAST

SOCIAL SUPPORTS

	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Informal Social Norms	[none elicited]				
PROD. ENG.		if secretary likes person, she doesn't interrrupt them in boss's office space is recognized as yours closing door	implied manners not to talk too loudly lets people know not to interrupt lets people know not to disturb			secretary interrupts people in boss's office she doesn't like

Table 11 Paradigm for Ways to Regulate Privacy through Cognitive and Overt Behaviors Devised or Displayed by the User

	DIMENSIONS OF CONTRAST					
			COGNITIVE			
	CONTRAST SET	Type	Uses Relating To Privacy	Other Uses	Positive Results	Negative Results
MANUF. ENG.	Environ-mental Screening	shuts mind when having a lot of thinking to do				
PROD. ENG.	[none elicited]					
			OVERT			
MANUF. ENG.	Verbal/ Nonverbal					
PROD. ENG.		lower voice visual cues, such as turning back to people	with real sensitive calls less prone to hear conversations or be interrupted			
MANUF. ENG.	Verbal/ Nonverbal	meetings are set up in super-visor's office	confidential conversations private communica-tion		can't overhear conversations	
	Terr./ Env. Mech.	set up meetings in conference room, having ability to close door				
PROD. ENG.		go to conference room go to library try to to find a more private area modify some visuals with blinds	confidential talks scheduling of work or evaluations verbal evaluations		quiet and no interruptions	usually does not bother modifying blinds because there's no door

STAGE II-BELIEFS MATRIX AND PREFERENCE RANKING

Beliefs Matrix

Measuring the extensiveness of beliefs within a population requires quantification. The Beliefs Matrix is constructed so that it can be statistically analyzed. Table 12 tabulates aggregated frequencies for all matrix cells in Production Engineering and Manufacturing Engineering. The distribution of scores reveals high frequencies clustering around certain design items (X) and activities (Y). High frequencies consistently clustered around activities dealing with acoustical and visual privacy and HAVING A DOOR, HAVING MINIMAL TRAFFIC ROUTED THROUGH MY AREA, and HAVING MY WORKSPACE LOCATED AWAY FROM MAIN TRAFFIC FLOW. High frequencies also consistently clustered around activities dealing mainly with acoustical privacy and HAVING A WORKSPACE WITH FLOOR-TO-CEILING SOLID WALLS.

The probability of association between design items and activities was calculated using the binomial distribution. The binomial distribution is the sampling distribution of the proportion (Hinkle, et al., 1979). Z-scores were computed for matrix cells whose p value (sample proportion) was greater than the hypothesized P value (population proportion). Table 13 reports z-scores using the binomial distribution for these matrix cells at the .01 level of significance. Hinkle, et al. explain that there is no way to reject the null hypothesis (i.e., Ho:P=a) if p is less than or equal to P as there is no region of rejection for the null

Table 12 Beliefs Matrix for Design Features Paired with Job Activities: Observed Frequencies (N=50)

High frequencies clustering around X and Y

[X] DESIGN FEATURES	[Y] ACTIVITIES	1. for supervising people (being able to see them)	2. for having little meetings	3. for concentrating	4. for talking privately on the phone	5. for talking privately in person	6. for minimizing interruptions	7. for minimizing noise distractions	8. for minimizing visual distractions	9. for communicating with people that work together	10. for evaluating people, writen and verbal	11. when using the computer	12. when using the CADAM scope	13. when reviewing engineering drawings	14. when writing or when drafting design concepts	ROW TOTAL
having a larger office	1.	12	35	9	10	20	16	15	13	25	16	9	13	44	34	271
having adequate storage space	2.	6	9	6	2	2	16	3	14	9	10	22	15	28	28	170
having direct pathways instead of the "maze effect"	3.	22	9	15	7	8	31	27	30	29	3	7	9	10	6	213
having modular furniture and equipment that's easy to rearrange in my cubicle	4.	12	24	20	14	16	19	17	26	17	9	33	21	33	29	290
having a cubicle height that I can stand up and look over if I am looking for someone	5.	36	7	6	6	6	14	11	12	29	7	4	5	7	6	156
having an adequate worksurface to spread out drawings	6.	6	29	37	4	6	18	8	15	24	2	28	26	46	42	291
having a workspace with 5'-0" H partitions	7.	24	10	18	16	16	19	17	21	18	13	8	8	8	7	203
having a workspace with 7'-0" H partitions	8.	8	20	27	26	25	30	28	33	8	21	12	11	8	8	265
having a workspace with floor-to-ceiling solid walls	9.	7	25	30	33	34	35	36	32	7	28	9	8	8	7	299
having a door	10.	15	31	33	37	37	36	38	35	11	30	12	7	8	10	340
having a conference room	11.	25	45	13	8	21	23	26	26	34	22	2	0	18	15	278
having a partition window with levelor blinds in my cubicle	12.	21	11	22	12	17	20	11	28	8	18	3	3	4	4	182
having an open area with no cubicles for my people, but having my overall group enclosed in partitions	13.	30	17	10	4	4	9	7	10	26	2	7	8	13	13	160
having groups that work together located together	14.	35	38	11	1	4	20	15	13	39	8	11	11	23	21	250
having minimal traffic routed through my area	15.	22	25	47	36	35	45	45	46	26	23	27	27	29	30	463
having my workspace located away from the main traffic flow	16.	21	25	47	35	36	46	46	47	23	22	27	26	31	33	465
having easy access to reference materials	17.	18	23	27	10	13	30	15	18	24	19	38	31	45	44	355
COLUMN TOTAL		320	383	378	261	300	427	365	419	357	253	259	229	363	337	4651

Table 13 Binomial Distribution Analysis Investigating the Strength of Association between Design Features (X) and Job Activities (Y)

P=.50 P=.25 p≤P

* Significant at .01 level

[X] DESIGN FEATURES	[Y] ACTIVITIES	1. for supervising people (being able to see them)	2. for having little meetings	3. for concentrating	4. for talking privately on the phone	5. for talking privately in person	6. for minimizing interruptions	7. for minimizing noise distractions	8. for minimizing visual distractions	9. for communicating with people that work together	10. for evaluating people, writen and verbal	11. when using the computer	12. when using the CADAM scope	13. when reviewing engineering drawings	14. when writing or when drafting design concepts
having a larger office	1.		3.09*			2.17	1.06	.77	.16	3.54*	1.06		.16	8.27*	2.73*
having adequate storage space	2.						1.06		.47			2.70*	.77	8.56*	.86
having direct pathways instead of the "maze effect"	3.	2.70*		.77			1.75	.57	1.44	1.45					
having modular furniture and equipment that's easy to rearrange in my cubicle	4.		3.26*	2.17	.47	1.06	1.89	1.34	.28	1.34		2.39*	2.44*	2.39*	1.15
having a cubicle height that I can stand up and look over if I am looking for someone	5.	3.47					.47			1.15					
having an adequate worksurface to spread out drawings	6.		1.15	3.87*			1.62		.77	3.26*		.86	.28	10.25*	6.56*
having a workspace with 5'-0" H partitions	7.			1.62	1.06	1.06	1.89	1.34	2.44*	1.62	.16				
having a workspace with 7'-0" H partitions	8.		2.17	.57	.28	3.54*	1.44	.86	2.39*		2.44*				
having a workspace with floor-to-ceiling solid walls	9.		3.54*	1.44	2.39*	2.73*	3.09*	3.47*	2.06		.86			.28	
having a door	10.	.77	1.75	2.39*	3.87*	3.87*	3.47*	4.31*	3.09*		1.44				
having a conference room	11.	3.54*	9.43*	.16		2.44*	2.98*	.28	.28	2.73*	2.71*			1.62	.77
having a partition window with levelor blinds in my cubicle	12.	2.44		2.70*		1.34	2.17*		.86		1.62			.16	.16
having an open area with no cubicles for my people, but having my overall group enclosed in partitions	13.	1.44	1.34							.28					
having groups that work together located together	14.	3.09*	4.31*				2.17	.77	.16	4.78*				2.98*	2.44*
having minimal traffic routed through my area	15.	2.71*	3.54*	13.10*	3.47*	3.09*	9.43*	9.43*	10.95*	.28	2.98*	.57	.57	1.15	1.44
having my workspace located away from the main traffic flow	16.	2.44*	3.54*	13.10*	3.09*	3.47*	10.95*	10.95*	13.10*	2.98*	2.71*	.57	.28	1.75	2.39*
having easy access to reference materials	17.	1.62	2.98*	.57		.16	1.44	.77	1.62	3.26*	1.89	4.31*	1.75	9.43*	8.27*

hypothesis in the left tail of the distribution.

The Domain Definition and content analysis and the frequency distribution of scores in the Beliefs Matrix were considered in determining hypothesized values of P (per cell). The P value was calculated at .50 for design items <u>frequently</u> mentioned by respondents in relation to certain activities. The P value was calculated at .25 for design items <u>rarely</u> mentioned by respondents in relation to other activities. The different frequencies may have occurred because the design items mentioned in relation to certain activities are considered important or not important to the engineers. On the other hand, the importance given to design items mentioned in relation to certain activities may depend upon its relevancy to the engineers' situation. For example, the content analysis indicated that few engineers have individual offices (i.e., most of the engineers share) and they rarely talk privately on the phone. In the Beliefs Matrix, the cell for design item X1 (HAVING A LARGER OFFICE) intersecting with activity Y4 (FOR TALKING PRIVATELY ON THE PHONE) resulted in 10 positive judgements. This low frequency may have occurred because the situation described in the intersection is not important to the engineers, or because it is not relevant to the engineers' particular situation, as the content analysis indicated. (See the content analysis and the Beliefs Matrix.)

P values were calculated per cell in order to determine the probability of association between design items and activities. The number of positive judgements must be greater than 32 to reject Ho:P=.50, and greater than 20 to reject Ho:P=.25, using a one-tailed test at the .01 level of significance. More than 64% of the sample must indicate association between X and Y for Ha:P>.50, and more than 40% of the sample must indicate association between X and Y for Ha:P>.25.

Table 13 identifies design features perceived by Gulfstream engineers as relating to certain activities by measured association. Z-scores reached significance for particular design features and activities dealing with privacy. These barriers and field characteristics are considered important in regulating privacy:

BARRIERS

1. HAVING A WORKSPACE WITH 5'-0" HIGH PARTITIONS is important FOR MINIMIZING VISUAL DISTRACTIONS.

2. HAVING A WORKSPACE WITH 7'-0" HIGH PARTITIONS is important FOR TALKING PRIVATELY ON THE PHONE, MINIMIZING VISUAL DISTRACTIONS, and EVALUATIING PEOPLE, WRITTEN AND VERBAL.

3. HAVING A WORKSPACE WITH FLOOR-TO-CEILING SOLID WALLS is important FOR TALKING PRIVATELY ON THE PHONE, TALKING PRIVATELY IN PERSON, MINIMIZING INTERRUPTIONS, and MINIMIZING NOISE DISTRACTIONS.

4. HAVING A DOOR is important FOR CONCENTRATING, TALKING PRIVATELY ON THE PHONE, TALKING PRIVATELY IN PERSON, MINIMIZING INTERRUPTIONS, MINIMIZING NOISE DISTRACTIONS, and MINIMIZING VISUAL DISTRACTIONS.

5. HAVING A CONFERENCE ROOM is important FOR TALKING PRIVATELY ON THE PHONE, MINIMIZING INTERRUPTIONS, and EVALUATING PEOPLE, WRITTEN AND VERBAL.

6. HAVING A PARTITION WINDOW WITH LEVELOR BLINDS IN MY CUBICLE is important FOR CONCENTRATING.

FIELD CHARACTERISTICS

7. HAVING MINIMAL TRAFFIC ROUTED THROUGH MY AREA is important FOR CONCENTRATING, TALKING PRIVATELY ON THE PHONE, TALKING PRIVATELY IN PERSON, MINIMIZING INTERRUPTIONS, MINIMIZING NOISE DISTRACTIONS, MINIMIZING VISUAL DISTRACTIONS, and EVALUATING PEOPLE, WRITTEN AND VERBAL.

8. HAVING MY WORKSPACE LOCATED AWAY FROM THE MAIN TRAFFIC FLOW is important FOR CONCENTRATING, TALKING PRIVATELY ON THE PHONE, TALKING PRIVATELY IN PERSON, MINIMIZING INTERRUPTIONS, MINIMIZING NOISE DISTRACTIONS, MINIMIZING VISUAL DISTRACTIONS, and EVALUATING PEOPLE, WRITTEN AND VERBAL.

Preference Ranking

The mean rank was computed per subgroup for each design item listed in the Beliefs Matrix in order to determine the relative importance of design items and subgroup differences. Table 14 displays the mean rank for each design item. Rankings were summed across all respondents and divided by the number of respondents per subgroup. The lower the mean rank the closer the design item is to being ranked first, or most important.

The wide range of scores per subgroup in Table 14 indicates a fair amount of consensus for each design item. Additionally, the smaller sample size in Production Engineering indicates less variance in Production Engineering than in Manufacturing Engineering. The sample size is also the population size for Production Engineering within a certain range of occupational rank--a unique situation. (An entire population is rarely studied.) Gulfstream layoffs experienced during the study account for this. Consequently, a new rank order of design items reflecting the probable population means for Manufacturing Engineering can be determined through t-test computations, as the population means are known for Production Engineering.

Table 14 Mean Ranks for Design Items ($\overline{X}$)

PRODUCTION ENGINEERING (N=39) Design Item	Mean Rank	MANUFACTURING ENGINEERING (N=50) Design Item	Mean Rank
having an adequate worksurface to spread out drawings	4.15	having an adequate worksurface to spread out drawings	4.30
having adequate storage	4.21	having easy access to reference materials	5.46
having easy access to reference materials	4.62	having adequate storage	6.10
having groups that work together located close together	5.46	having minimal traffic routed through my area	6.46
having minimal traffic routed through my area	7.03	having my workspace located away from the main traffic flow	6.56
having a conference room	7.44	having groups that work together located close together	6.74
having my workspace located away from the main traffic flow	7.87	having modular furniture and equipment that's easy to arrange in my cubicle	7.18
having modular furniture and equipment that's easy to arrange in my cubicle	8.85	having direct pathways instead of the "maze effect"	9.44
having direct pathways instead of the "maze effect"	9.38	having a larger office	9.78
having a larger office	9.59	having a conference room	9.94
having a door	10.72	having a cubicle height that I can stand up and see over if I am looking for somebody	10.24
having an open area with no cubicles for my people, but having my overall group enclosed in partitions	11.44	having a workspace with 5'-0" high partitions	10.40
having a cubicle height that I can stand up and see over if I am looking for somebody	11.72	having a workspace with 7'-0" high partitions	10.58
having a workspace with floor-to-ceiling solid walls	12.13	having a door	11.50
having a workspace with 7'-0" high partitions	12.44	having a workspace with floor-to-ceiling solid walls	11.68
having a partition window with levelor blinds in my cubicle	12.69	having a partition window with levelor blinds in my cubicle	13.10
having a workspace with 5'-0" high partitions	13.28	having an open area with no cubicles for my people, but having my overall group enclosed in partitions	13.54

T-test

The independent t-test determines if two sample means are different enough to conclude, with a high degree of confidence, that the population means are different from one another (Huck, et al., 1974). Table 15 reports t-test results at the .05 and .01 levels of significance. The degrees of freedom were adjusted as the "sample" sizes are not equal.

It can be seen that the population means are significantly different for HAVING ADEQUATE STORAGE, A CONFERENCE ROOM, A WORKSPACE WITH 5'-0" HIGH PARTITIONS, and AN OPEN AREA WITH NO CUBICLES FOR MY PEOPLE, BUT HAVING MY OVERALL GROUP ENCLOSED IN PARTITIONS. The null hypothesis (i.e., "no difference") is accepted for the remaining thirteen design items. Table 16 positions the probable mean rank of each design item to reflect Production Engineering and Manufacturing Engineering populations where Ho:$\mu_1 = \mu_2$ and Ha:$\mu_1 \neq \mu_2$

HAVING AN ADEQUATE WORKSURFACE TO SPREAD OUT DRAWINGS, ADEQUATE STORAGE, EASY ACCESS TO REFERENCE MATERIALS, and GROUPS THAT WORK TOGETHER LOCATED CLOSE TOGETHER are ranked as the most important design items for Production and Manufacturing engineers in their work environments. HAVING A WORKSPACE WITH FLOOR-TO-CEILING SOLID WALLS, A WORKSPACE WITH 7'-0" HIGH PARTITIONS, A PARTITION WINDOW WITH LEVELOR BLINDS IN MY CUBICLE, and A WORKSPACE WITH 5'-0" HIGH PARTITIONS are ranked least important to Production engineers. HAVING A WORKSPACE WITH FLOOR-TO-

Table 15 Independent t-test Results for Design Items

Design Item	Prod. Eng. M	Prod. Eng. S.D.	Manuf. Eng. M	Manuf. Eng. S.D.	t value
having a larger office	9.59	3.62	9.78	4.85	-.21
having adequate storage	4.21	2.37	6.10	3.93	-2.78*
having direct pathways instead of the "maze effect"	9.38	4.25	9.44	3.21	-.07
having modular furniture and equipment that's easy to rearrange in my cubicle	8.85	4.32	7.18	4.82	1.69
having a cubicle height that I can stand up and see over if I am looking for somebody	11.72	4.30	10.24	4.02	1.63
having an adequate work surface to spread out drawings	4.15	3.72	4.30	3.67	-.18
having a workspace with 5'-0" high partitions	13.28	2.53	10.40	4.68	3.66*
having a workspace with 7'-0" high partitions	12.44	4.21	10.50	4.90	1.89
having a workspace with floor-to-ceiling solid walls	12.13	4.84	11.60	4.10	.46
having a door	10.72	4.52	11.50	4.45	-.80
having a conference room	7.44	3.52	9.94	3.50	-3.29*
having a partition window with levelor blinds in my cubicle	12.69	3.74	13.10	3.38	-.52
having an open area with no cubicles for my people, but having my overall group enclosed in partitions	11.44	5.19	13.50	4.17	-2.04**
having groups that work together located close together	5.46	3.73	6.74	4.34	-1.47
having minimal traffic routed through my area	7.03	3.12	6.46	3.40	.80
having my workspace located away from the main traffic flow	7.87	3.32	6.56	4.14	1.64
having easy access to reference materials	4.62	2.79	5.46	3.44	-1.26

*Significant at .01 level
**Significant at .05 level

Table 16 Mean Ranks for Design Items (u)

PRODUCTION ENGINEERING Design Item	Mean Rank	MANUFACTURING ENGINEERING Design Item	Mean Rank
having an adequate worksurface to spread out drawings	4.15	having an adequate worksurface to spread out drawings	4.15
having adequate storage	4.21*	having easy access to reference materials	4.62
having easy access to reference materials	4.62	having groups that work together located close together	5.46
having groups that work together located close together	5.46	having adequate storage	6.10*
having minimal traffic routed through my area	7.03	having minimal traffic routed through my area	7.03
having a conference room	7.44*	having my workspace located away from the main traffic flow	7.87
having my workspace located away from the main traffic flow	7.87	having modular furniture and equipment that's easy to arrange in my cubicle	8.85
having modular furniture and equipment that's easy to arrange in my cubicle	8.85	having direct pathways instead of the "maze effect"	9.38
having direct pathways instead of the "maze effect"	9.38	having a larger office	9.59
having a larger office	9.59	having a conference room	9.94*
having a door	10.72	having a workspace with 5'-0" high partitions	10.40*
having an open area with no cubicles for my people, but having my overall group enclosed in partitions	11.44*	having a door	10.72
having a cubicle height that I can stand up and see over if I am looking for somebody	11.72	having a cubicle height that I can stand up and see over if I am looking for somebody	11.72
having a workspace with floor-to-ceiling solid walls	12.13	having a workspace with floor-to-ceiling solid walls	12.13
having a workspace with 7'-0" high partitions	12.44	having a workspace with 7'-0" high partitions	12.44
having a partition window with levelor blinds in my cubicle	12.69	having a partition window with levelor blinds in my cubicle	12.69
having a workspace with 5'-0" high partitions	13.28*	having an open area with no cubicles for my people, but having my overall group enclosed in partitions	13.54*

$*Ha: \mu_1 \neq \mu_2$

CEILING SOLID WALLS, A WORKSPACE WITH 7'-0" HIGH PARTITIONS, A PARTITION WINDOW WITH LEVELOR BLINDS IN MY CUBICLE, and AN OPEN AREA WITH NO CUBICLES FOR MY PEOPLE, BUT HAVING MY OVERALL GROUP ENCLOSED IN PARTITIONS are ranked least important to Manufacturing engineers.

Ethnographic data and analysis help to explain differences in the ranking that could not be determined through a survey questionnaire alone. During the interviews, both Production and Manufacturing engineers expressed a need for adequate storage in their workspace (to accomodate personal belongings and work-related materials) and also in a central office location for materials used by everyone. Production engineers, however, appeared to have a greater concern over lack of storage in their workspaces for work-related materials. (It should be noted that field observation conducted after the interviews revealed that the problems with a lack of storage in Production Engineering have decreased due to the reduction in personnel that occurred during the study.) HAVING A CONFERENCE ROOM is ranked sixth in importance by Production engineers and tenth in importance by Manufacturing engineers. During the interviews, Production engineers were concerned about conference rooms not being available, whereas Manufacturing engineers did not appear to have a problem getting access to a nearby conference room. HAVING A WORKSPACE WITH 5'-0" HIGH PARTITIONS is ranked seventeenth, or least important, by Production engineers, and eleventh in importance by Manufacturing engineers. Field observation revealed that Production engineers participating in the study are housed predominantly in workspaces with 5'-0" high partitions and are experiencing acoustical problems with these partitions. Manufacturing engineers participating in the study, on the other hand, are located predominantly in open areas without partitions and, for the most part, have not used the 5'-0" high partitions in their area. Manufacturing engineers, instead, are experiencing acoustical and visual problems with their open area. This may explain why HAVING AN OPEN AREA WITH NO CUBICLES FOR MY PEOPLE, BUT HAVING MY OVERALL GROUP ENCLOSED IN PARTITIONS is ranked seventeenth, or least important, by Manufacturing engineers.

CONCLUSION

The triangulation of data and analysis through the HEM extended theoretical considerations regarding privacy regulation. The model, presented in the "Introduction," suggests a more detailed method for classifying mechanisms based on regulatory characteristics. The model guided the content analysis in the identification of folk terms relating to privacy regulation. Semantic relationships were analyzed in terms of behavior and knowledge that Gulfstream engineers have learned or created. A descriptive system of privacy regulation elicited from the domain, taxonomic, and componential analyses substantiated the environmental mechanisms classified in the model.

The Beliefs Matrix and Importance Ranking analyses taken together can be analyzed to ascertain in a detailed way what design features Gulfstream engineers associate with privacy regulation and where privacy fits into the engineers'overall perception of what is important in their work environments. These findings are supported by field observation, photodocumentaton, and the Domain Definition. In the next chapter, the three hypotheses, generated from major variables elicited during the Domain Definition, are discussed in relation to these findings and what the results suggest.

CHAPTER VII

FINDINGS

The findings of the Gulfstream project and what the results suggest are presented in this chapter. The triangulation of data analysis through the Heuristic Elicitation Methodology brings the study full cycle. The conceptual framework of privacy regulation, guiding the research, was presented in a model. Environmental, social, and behavioral mechanisms classified in the model were substantiated through a descriptive system of privacy regulation elicited during the Domain Definition and identified through content analysis. The Beliefs Matrix and Preference Ranking taken together determined what design features, devised or deployed by designers, Gulfstream engineers associate with privacy regulation and where privacy fits into the engineers' overall perception of what is important in their work environments. Finally, linking the later, more quantitative Beliefs Matrix and Preference Ranking data and analyses with the earlier, more qualitative observational and Domain Definition data provides support for the three hypotheses developed early in the study.

Gulfstream engineers associate eight out of seventeen design items listed in the Beliefs Matrix with privacy regulation. Certain field characteristics and barriers are considered important for regulating activities dealing with acoustical and visual privacy. The engineers associate the two <u>field characteristics</u>, having minimal traffic routed through the worker's area and the workspace located away from the main traffic flow with privacy regulation. The engineers also associate the <u>barriers</u>, having a workspace with 5'-0" high partitions, 7'-0" high partitions, floor-to-ceiling solid walls, a door, a conference room, and a partition window with levelor blinds in the worker's cubicle with privacy regulation.

Interestingly, the field characteristics and barriers differ in their degree of association with the seven activities directly related to acoustical and visual privacy. Where privacy fits into the engineers' overall perception of what is important in their work environments was measured through the Preference Ranking. The three hypotheses are discussed in relation to the project findings and are supported by verbatim responses from the Domain Definition, field observation, and photodocumentation. The findings were somewhat unexpected.

HYPOTHESES CONCERNING PHYSICAL ELEMENTS DEVISED OR DEPLOYED BY DESIGNERS

Hypothesis 1

Design features associated with privacy regulation in work environments are more important to the user than design features not associated with privacy regulation.

Design items associated with privacy regulation are not perceived by Gulfstream engineers as the most important design items. Those design items that the engineers believe necessary to perform overall basic job functions are considered most important: HAVING AN ADEQUATE WORKSURFACE TO SPREAD OUT DRAWINGS; ADEQUATE STORAGE; EASY ACCESS TO REFERENCE MATERIALS; and GROUPS THAT WORK TOGETHER LOCATED CLOSE TOGETHER.

Having an Adequate Worksurface to Spread Out Drawings

Production and Manufacturing engineers rank HAVING AN ADEQUATE WORKSURFACE TO SPREAD OUT DRAWINGS (vertically and/or horizontally) as the most important design item:

> table large enough to lay drawings out on--separate table to leave drawings on once start reviewing [without cluttering up desk]; more workspace to lay plans on--increase depth of counter plus increase length; need a place to lay out drawings and specifications for several people to look at at once; ample table, large enough to lay drawings out--larger than now; adequate worksurface for multiple projects and multiple tasks. [Production engineers]

> enough room to hang up a drawing, [I'd] rather have it hanging--just somewhere close, as it's hanging [I] can refer to it--than on a table; table where we could lay the prints out, need to be able to leave out, sometimes for a period of days but don't need to lock surface up; large table for reviewing drawings, 8' would be sufficient size; plenty of table space, [I] am constantly involved in [several jobs] at one time; enough space to spread out where I can see the whole picture [drawings]--notes, instructions [that are] in different locations--I want to be able to see all of it at the same time--I want to be able to put it [drawings] somewhere I can see it easily, [a] place to hang my drawings up to look at them.
> [Manufacturing engineers]

It is not obvious that CAD will replace large reference displays and sheets, so the need for adequate worksurfaces to spread out drawings should continue in the coming years. Note that the particular need for layout and display surfaces is not necessarily the same for office workers. People who work with "sets" of drawings frequently move from referring to one sheet to referring to another. Gulfstream engineers, on the other hand, refer to overall "master" sheets that are lengthy and sometimes need to remain displayed as a reference for days. Also, the engineers mark up some of the drawings, and they need a backing surface in order to write or print clearly.

Photos 9, 10, and 11 suggest some of the difficulties Production and Manufacturing engineers are currently experiencing with spreading out drawings on their worksurfaces:

> lack of space; if drawings too big, I have to go somewhere else [to review drawings]; need somewhere to put drawings, right now have only limited work surface; we get those engineering drawings and we don't have a place to spread out on.
> [Production engineers]

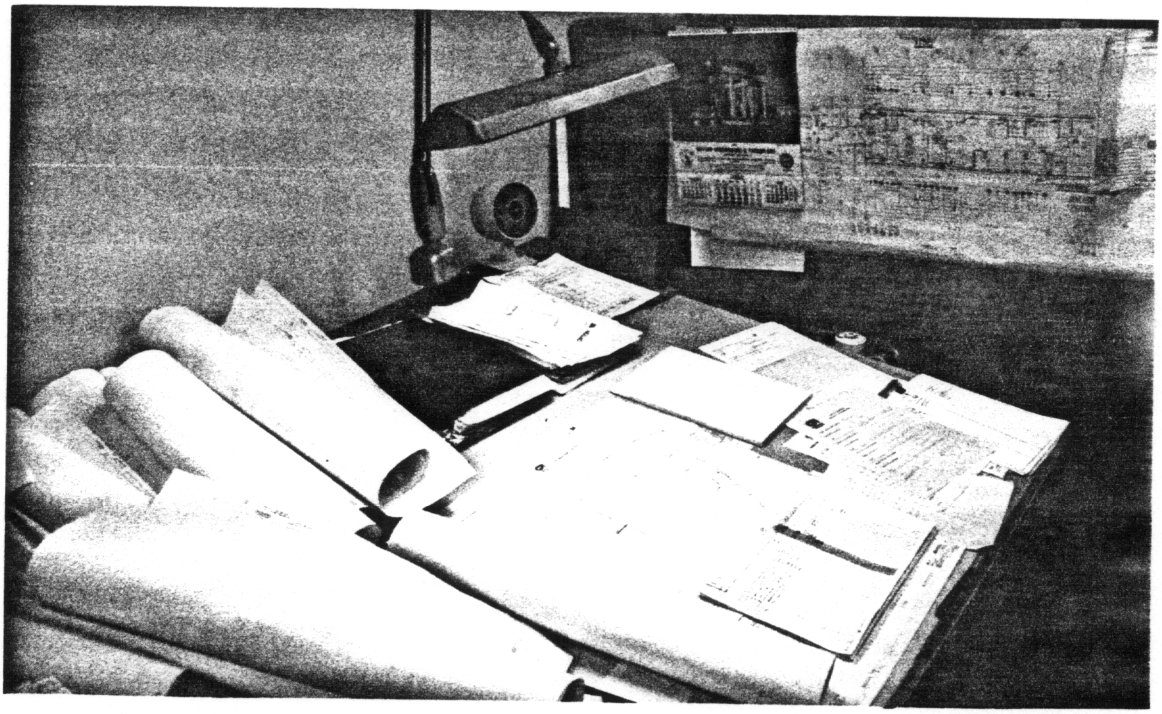

Photo 9 Worksurface in Production Engineering

Photo 10 Worksurface in Manufacturing Engineering

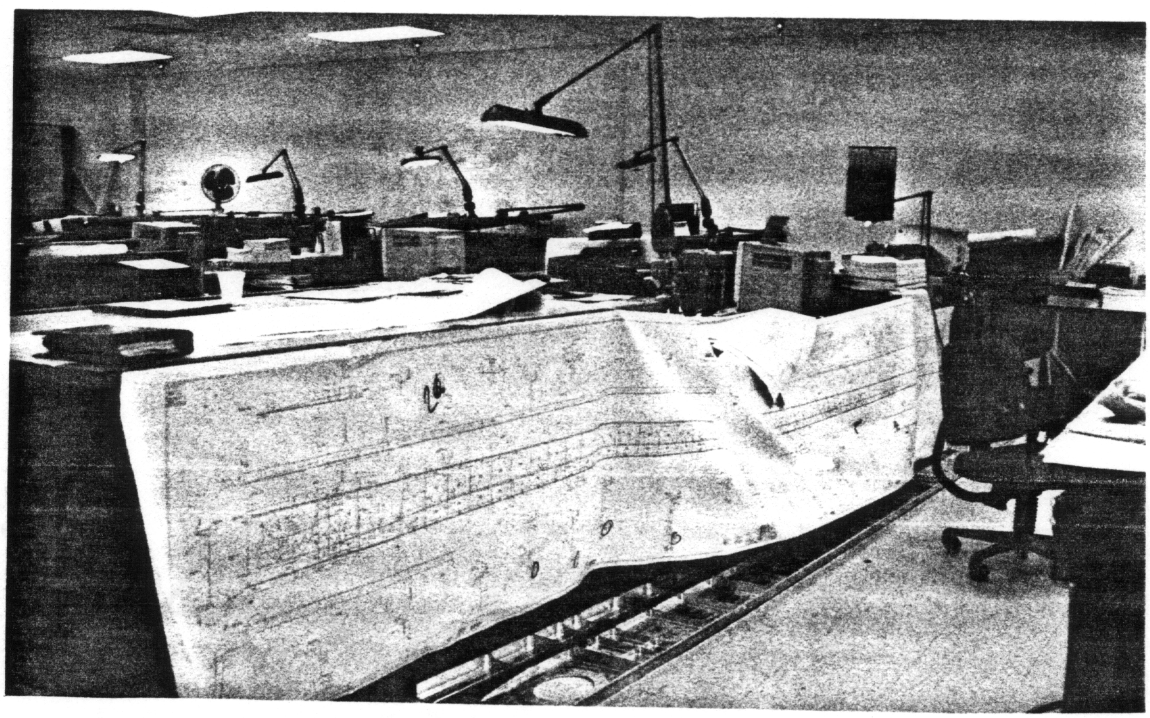

Photo 11 Worksurface in Manufacturing Engineering

> not enough room to hang up blueprints and stuff--that area always seems to be cluttered; no place to spread drawings out--I've seen some guys lay them out in the aisle, 20-30'long; the way it is now, I have to spread the drawing out on my desk and it covers everything, that's why I spread it out; [it's] difficult not having a large enough table [to look over drawings].
> [Manufacturing engineers]

Having Adequate Storage and Easy Access to Reference Materials

Responses from Production and Manufacturing engineers indicate that having adequate storage (in the workspace and also in a central office location for materials used by everyone) and easy access to reference materials facilitate job performance:

> being able to have reference material handy and not having to go looking around for it; plenty of file cabinets, more shelving and more filing storage space needed, adequate space for reference material and documents; [general office surroundings should have a] central location to keep literature specs., and CAD scopes, and an accessible PC.
> [Production engineers]

> adequate shelving or cabinets for reference materials--requirement specifications, job fabrication, [and] procedures; having proper support data [catalogues, engineering prints]; place to put something while working at scope, reference material or something else--I forget how to do that but I'll do it this way because the reference material is someplace else, instead of trying to do it right.
> [Manufacturing engineers]

Responses also indicate a need for more storage and easier access to reference materials:

> [some of technical material], it's kept on piles on the floor because we're in a borrowed area, files belong to other people--area used to be their area and [they] still use those files; don't have readily accessible reference material.
> [Production Engineering]

> not too much shelf space, no place to put reference manuals, reference drawings, or whatever [while working on CAD scope].
> [Manufacturing Engineering]

Production engineers, in particular, emphasize the need for more storage in their workspace. As previously stated, more storage is now available due to the reduction in personnel that occurred during the study.

Having Groups That Work Together Located Close Together

Production and Manufacturing engineers stress the need for having groups that work together located close together:

> co-workers close enough to work together; have close contact with people I work with; avoid people having to leave their work area to do their work; important to have guys that work together located close together. [Production engineers]

> our group is together; a place [personal work area] that is adjacent to people I work with; work close with group--we're right near each other; accessibility to the people [in] my group; like it where you could be able to contact other employees within my group in that area and not be so isolated, [I] don't want supervisor looking at me either. [Manufacturing engineers]

Production engineers, who are continually working on different projects, are relocated to different areas for the duration of projects. Their floorplan is laid out based upon spatial requirements rather than the information flow within and between groups. Manufacturing engineers, on the other hand, are not relocated to different areas for the duration of projects. Their floorplan is laid out based upon the information flow within and between groups. Production engineers express the need for groups working together to be located nearer each other:

> everyone is not with their groups; we are fractured right now [due to location], we have a communication problem right now; major problem has to do with people we work with--space problem--we've got people scattered all over the place and we should all be in

> one area--[there are] even some in trailors; jobs in workstation not having nothing to do with each other, if someone is here to see me about my work, hard to concentrate; chaotic, such as seventeenth move of workstation--nothing is permanent.
> [Production engineers]

Certain design items perceived by Gulfstream engineers as relating to activities dealing with acoustical and visual privacy are ranked second in overall importance, immediately after the design items that are necessary to perform basic job functions: HAVING MINIMAL TRAFFIC ROUTED THROUGH MY AREA, A CONFERENCE ROOM, and MY WORKSPACE LOCATED AWAY FROM THE MAIN TRAFFIC FLOW are ranked fifth, sixth, and seventh by Production engineers. The two field characteristics, representing orientation of the workspace, are ranked fifth and sixth by Manufacturing engineers. The findings suggest that once design features are provided that are necessary to perform basic job functions, then certain design features associated with privacy regulation take precedence. Congruently, Kaplan's (1977) comparison of privacy needs with Maslow's 1943 Hierarchy of Needs positions privacy as the second basic need of an individual. (Kaplan, however, does not discuss nor position the relative importance of design features that are necessary to perform basic job functions.)

Hypothesis 2

Barriers and field characteristics associated with privacy regulation in work environments are equally important to the user.

Field characteristics associated with privacy regulation are considered more important to Gulfstream engineers than barriers associated with privacy regulation: HAVING MINIMAL TRAFFIC ROUTED THROUGH MY AREA and MY WORKSPACE LOCATED AWAY FROM THE MAIN TRAFFIC FLOW are ranked fifth and seventh by Production engineers and fifth and sixth by Manufacturing Engineers.

Barriers associated with privacy regulation are considered less important by both groups. Out of seventeen design items, HAVING A WORKSPACE WITH FLOOR-TO-CEILING SOLID WALLS, A WORKSPACE WITH 7'-0" HIGH PARTITIONS, A PARTITION WINDOW WITH LEVELOR BLINDS IN MY CUBICLE, and A WORKSPACE WITH 5'-0" HIGH PARTITIONS are ranked least important by Production engineers. HAVING A WORKSPACE WITH FLOOR-TO-CEILING SOLID WALLS, A WORKSPACE WITH 7'-0" HIGH PARTITIONS, and A PARTITION WINDOW WITH LEVELOR BLINDS IN MY CUBICLE are ranked least important by Manufacturing engineers. (Note that HAVING AN OPEN AREA WITH NO CUBICLES FOR MY PEOPLE, BUT HAVING MY OVERALL GROUP ENCLOSED IN PARTITIONS is ranked seventeenth by Manufacturing engineers, however, Gulfstream engineers do not associate this barrier with privacy regulation.)

In the ideal work environment, Production and Manufacturing engineers prefer their workspace to be located away from the main traffic flow (particularly corridors) and prefer that traffic not to be routed through their area:

> traffic has not been routed through my area [Stress area], adding to that privacy illusion; I like being in this row--not a real high traffic area; location [of office] on perimeter, able to achieve some acoustical privacy this way; not in the mainstream [cubicle], I will not be interrupted that much; how space is laid out, certain design elements in a corner location, so can't just walk in without me noticing; when it's quiet, when you don't have the distractions of other people in the area and out in the hallway.
> [Production Engineering]
>
> enclosed area away from main traffic; not to be located on main aisle; it would not have a coffee machine nearby.
> [Manufacturing Engineering]

The findings suggest that orientation of the workspace may be a key environmental mechanism that designers can devise or deploy to regulate privacy, even more so than erecting walls or installing partitions. HAVING MINIMAL TRAFFIC ROUTED THROUGH MY AREA and MY WORKSPACE LOCATED AWAY FROM THE MAIN TRAFFIC FLOW are the only design items associated with all seven activities directly related to acoustical and visual privacy listed in the Beliefs Matrix. By measured association, Gulfstream engineers consider these two design items important FOR CONCENTRATING, TALKING PRIVATELY IN PERSON, TALKING PRIVATELY ON THE PHONE, MINIMIZING INTERRUPTIONS, MINIMIZING NOISE DISTRACTIONS, MINIMIZING VISUAL DISTRACTIONS, and EVALUATING PEOPLE, WRITTEN AND VERBAL.

No one design component provides the necessary acoustical and visual control needed in the open-plan office. For optimum performance, Herbert (1980) recommends using a combination of freestanding barriers, sound-absorbent building finishes, sound masking, and proper distancing between workspaces. The Gulfstream project demonstrates that proper orientation of the workspace is also an important variable for acoustical and visual control. The positioning of fixed and semi-fixed design features in the engineers' workspaces affects their line of vision and contributes to acoustical problems (e.g., some partitions open directly onto traffic corridors in Production Engineering). Mehrabian (1976) proposes that the line of vision and positioning of fixed and semi-fixed design features affects social interactions. Zeisel (1984) points out that Festinger, et al., as early as 1950, stressed the importance of "functional" distance:

> Two places oriented so that people using them have a higher chance of casually seeing or meeting one another may be considered "functionally" closer than two equidistant places oriented to minimize chance encounters. (p. 134)

Specific to Gulfstream, the findings suggest that the design components necessary for acoustical and visual control should be reevaluated in Production and Manufacturing Engineering. Responses indicate that loss in production time and potential mistakes occur due to visual and acoustical distractions. These very likely are impeding job performance:

> if trying to be private, problem finding a place to go; when I want to review somebody, I have to go find a full walled office--confidential conversations can be overheard; so wide open [office] in the mainstream, can't talk in a normal level--everybody and his brother is listening to what's going on;

> sound carries--need more privacy; there's a coffee pot--people like to hold conferences in the aisleways; without partitions, at major corridors, traffic going by [causes] lots of interruptions; noise level--hard to concentrate; noise, when trying to put something together in your mind, you can get distracted; being too wide open, trying to understand why the guy did what he did, trying to get inside his head, [I] get engrossed, lose a lot of time with distractions--phone ringing off the hook and speaker phone [with] two-way conversations.
> [Production Engineering]
>
> noise and acoustical distractions--[I] almost made a mistake, I found a $30,000 mistake one time, I'd like to think it's due to distractions and not my own incompetence; people walking by is distracting--being in an open area, it's too easy to get involved, to turn around and be distracted by other activities going on around you; coffee pot should be away from work areas, people hang around a lot and it causes a distraction; I'm distracted by co-workers and other people walking down the hall; distracting--here I am on the main hallway--we have a hard tile floor, it's impossible to miss someone when they're walking by; no privacy--people walking by, they distract you--you know the sound of their footsteps--then talking, and just generally being able to see [them] while you're trying to work; lack of partitions makes it a little harder to hear sometimes and we work at very close tolerances--if there's a lot of mumbo-jumbo going around, I think it can lead to you making a mistake--we work with parts that are very very costly, some are easily $20,000 a part--like wing ribs, [and] crane beams.
> [Manufacturing Engineering]

Photos 12-14 display coffee pots, mail areas, exit doors, and restroom facilities located near workspaces that contribute to visual and acoustical distractions. Photos 15-17 display visual and acoustical distractions that the engineers experience from corridor traffic and conversations at workspaces. Orientation of the workspace is especially critical for Manufacturing engineers who are predominantly housed in an open area without walls or partitions. "Sequence sampling" (Altmann, 1974) provides additional

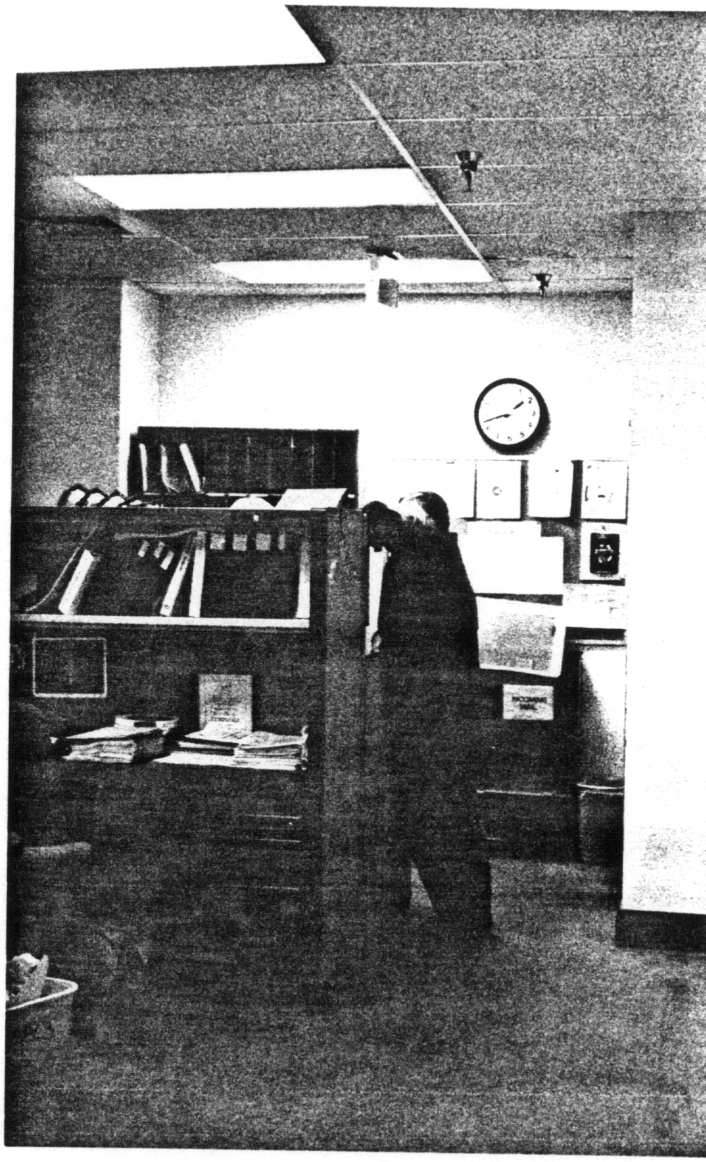

Photo 12 Mail Area in Production Engineering

Photo 13 Coffee Pot, Exit Door and Restroom Facilities in Manufacturing Engineering

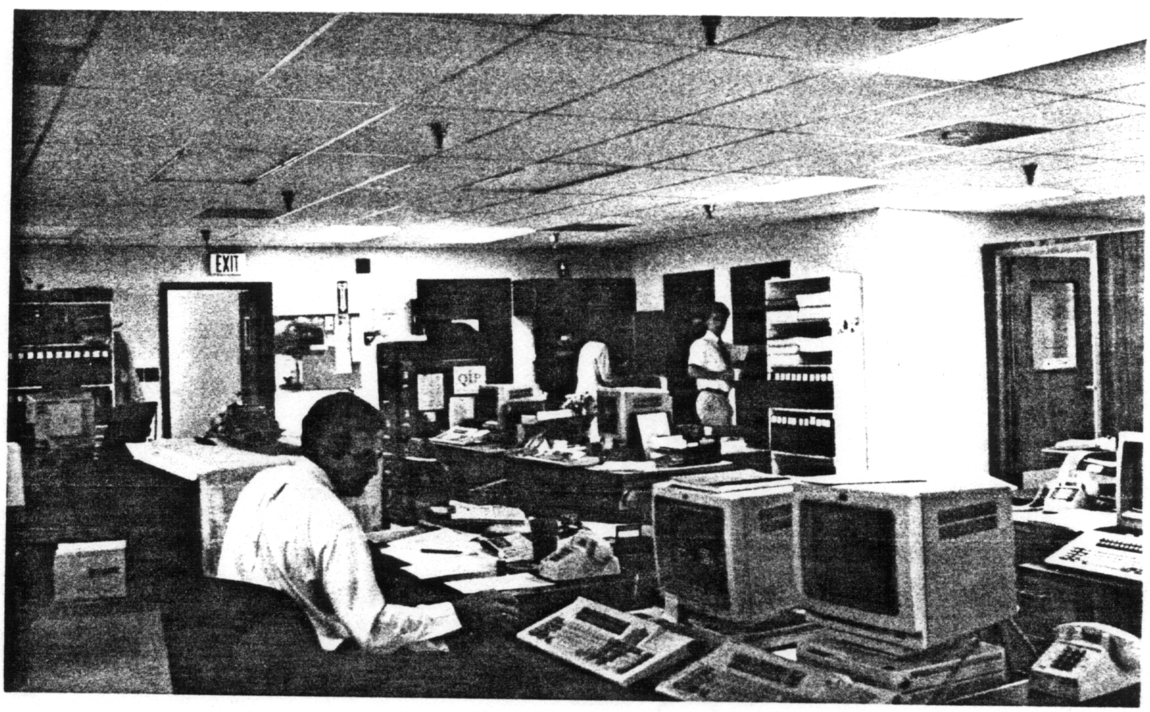

Photo 14 Coffee Pot, Exit Door and Restroom Facilities in Manufacturing Engineering

Photo 15 Corridor Traffic and Conversations at Workspaces in Production Engineering

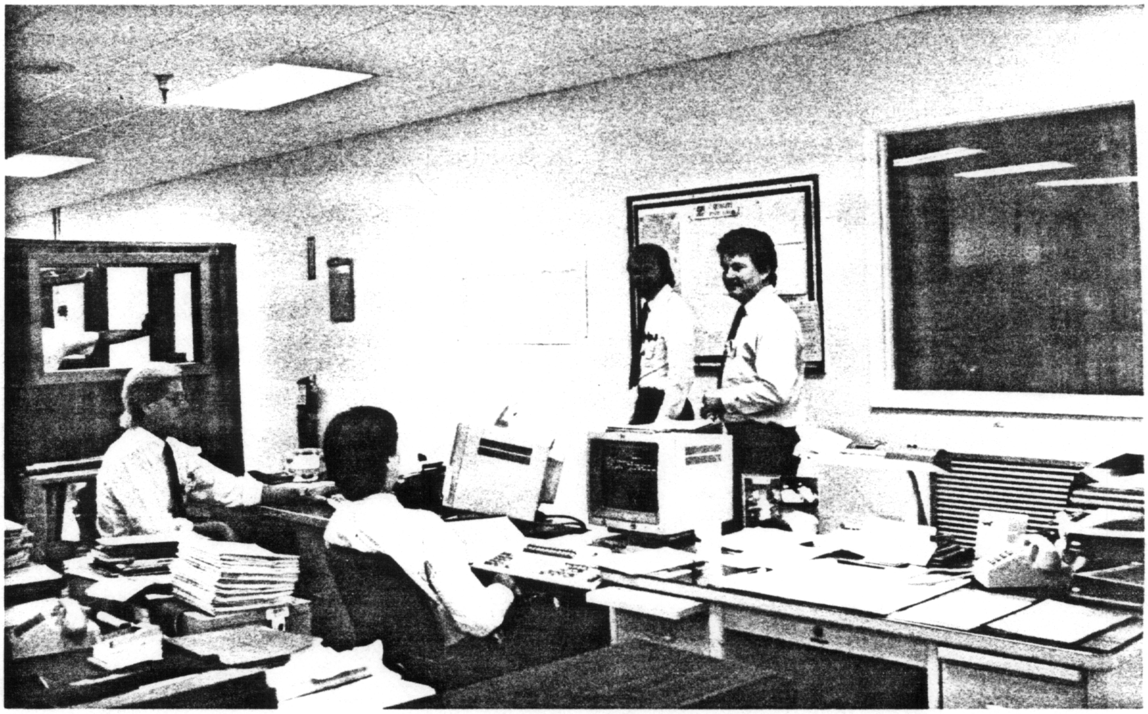

Photo 16 Corridor Traffic in Manufacturing Engineering

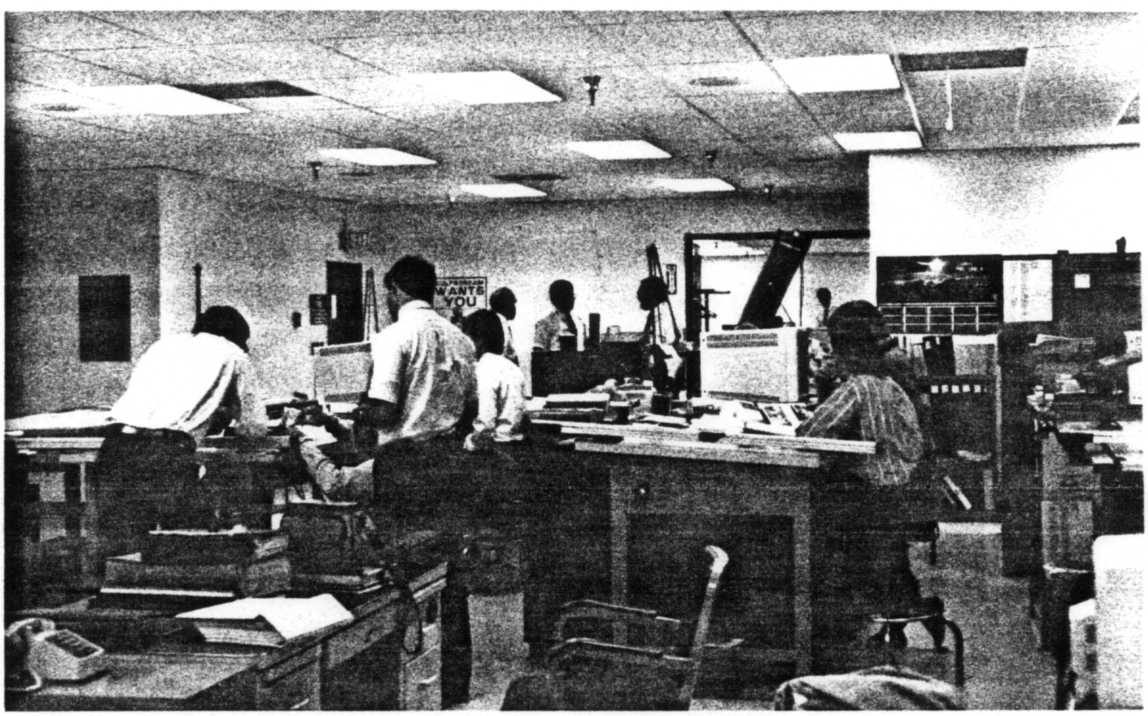

Photo 17 Conversations at Workspaces in Manufacturing Engineering

documentation of how critical orientation of the workspace is in Manufacturing Engineering. Figure 12 tabulates the number of times subjects looked up as people walked by their desks during fifteen and thirty minute intervals. Subject A, located near a major traffic corridor, looked up 22 of the 57 times that people walked by his desk during a fifteen minute period. Subjects B,C, and D are located near an average traffic corridor. Subject B looked up 5 of the 22 times that people walked by the his desk during a fifteen minute period. During a 30 minute period, subject C looked up 15 of the 47 times that people walked by his desk; and subject D looked up 16 of the 46 times that people walked by his desk. Subject E, located near a minor traffic corridor, looked up 7 of the 19 times that people walked by his desk during a thirty minute period.

Hypothesis 3

The acoustical property associated with a wall or partition is perceived by the user as more important in regulating privacy in work environments than the visual property associated with the height of a wall or partition.

Gulfstream engineers associate 5'-0" high partitions with regulating visual privacy, but not acoustical privacy. Out of the seven activities relating to acoustical and visual privacy listed in the Beliefs Matrix, HAVING A WORKSPACE WITH 5'-0" HIGH PARTITIONS is considered important only FOR MINIMIZING VISUAL DISTRACTIONS. The 7'-0" high partitions

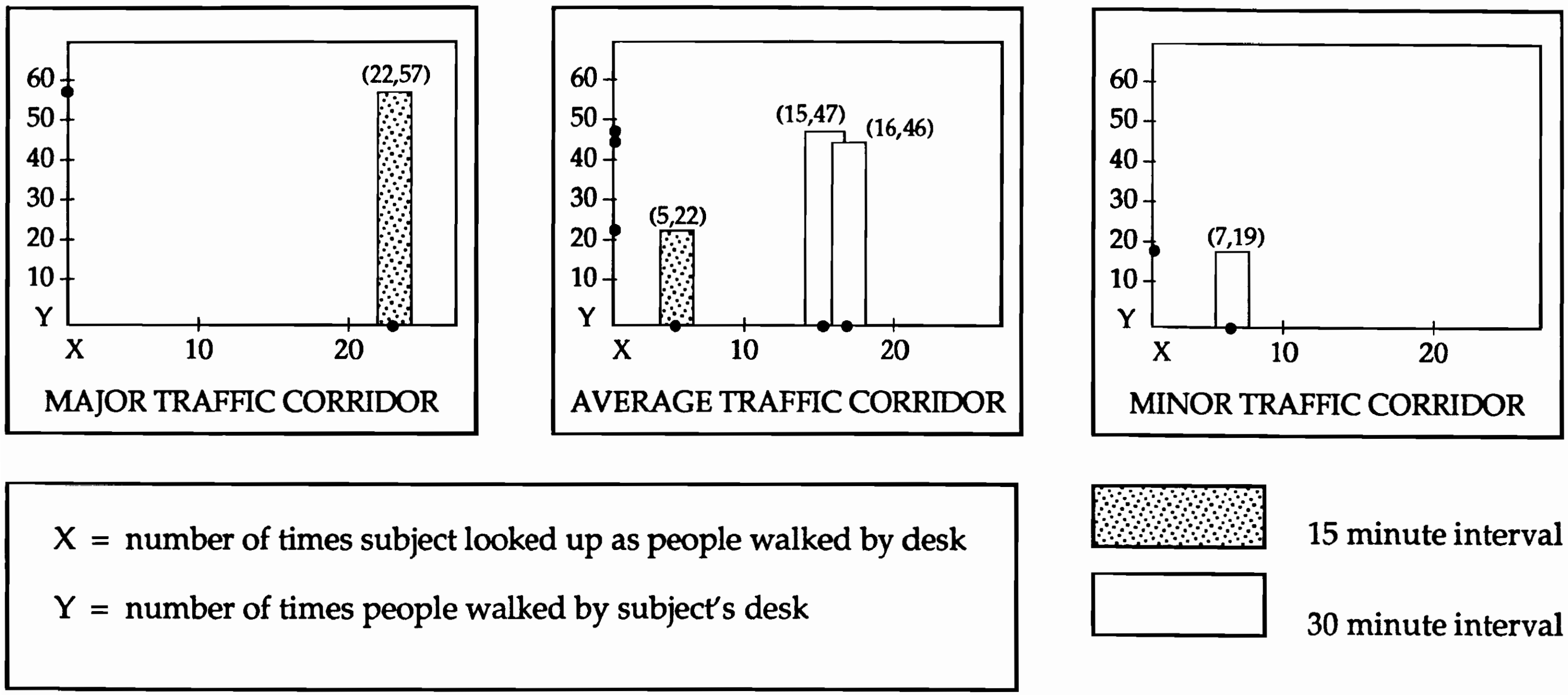

Figure 12 Visual and Acoustical Distractions Observed in Manufacturing Engineering

are associated with regulating visual privacy and some activities dealing with acoustical privacy: HAVING A WORKSPACE WITH 7'-0" HIGH PARTITIONS is considered important FOR TALKING PRIVATELY IN PERSON; MINIMIZING VISUAL DISTRACTIONS; and FOR EVALUATING PEOPLE, WRITTEN AND VERBAL. Gulfstream engineers, however, do not associate either partition height with concentrating, talking privately on the phone, minimizing interruptions, or minimizing noise distractions--all attributes of acoustical privacy.

The engineers may perceive that the 7'-0" high partitions provide some acoustical privacy because of the <u>actual</u> acoustical separation. This depends upon important building components, particularly the location of sound-reflective light fixtures (which act as mirrors of high frequency sound) and the distance between speaker and listener (due to the effect of specular reflection from the acoustical tile ceiling). Herbert (1980) explains that the Articulation Index (i.e. percent of words spoken that can be understood by a person listening under specified conditions) correlates well with subjective responses to privacy. In other words, the less speech intelligibility, which results in a low Articulation Index, the more private the office occupant feels and vice versa. The Gulfstream project did not physically measure the Articulation Index, so the efficiency of the actual acoustical separation is not known. The ambient sound level in Production Engineering, however, appears to be high, based upon field observations. Production engineers who are housed predominantly in workspaces enclosed by 5'-0" high partitions, as stated earlier, report acoustical problems with the partitions.

Interestingly, the engineers associate floor-to-ceiling solid walls with the majority of activities related to acoustical privacy, but not to visual privacy: HAVING A WORKSPACE WITH FLOOR-TO-CEILING SOLID WALLS is considered important FOR CONCENTRATING, TALKING PRIVATELY ON THE PHONE, TALKING PRIVATELY IN PERSON, MINIMIZING INTERRUPTIONS, and MINIMIZING ACOUSTICAL DISTRACTIONS.

The engineers appear to judge barriers, such as walls or partitions, in terms of their perceived acoustical property for regulating privacy more so than the particular height of the barrier, a visual property:

> in a management job, more soundproof; due to partitions and sound proof, it's private enough; opposed to a completely open [office], I liked the partitions [5'H]--[They] cushion enough sound so you can concentrate; a lot quieter with modular partitions; I don't have confidential conversations to deal with.
> [Production Engineering]

> partitions, when you wanted to talk to somebody you could, but when you did need some privacy to think things out, you could; cubicles or partitions would help a lot, because we could hear over the phone better; [cubicle] privacy--enough to cut me off from the noise; some sort of noise-deadening dividers--there's no doubt about it, planning these parts is a complicated process, people's lives depend on how [well] we do this job; liked the white noise [environment at former employment]--it was interesting how it was able to keep the noise transference from other parts of the office--we had 600-700 people in our office with open partitions, but when you stepped inside it you couldn't hear a single word.
> [Manufacturing Engineering]

Manufacturing engineers prefer having a workspace enclosed in 5'-0" high partitions rather than floor-to-ceiling solid walls or 7'-0" high partitions. Production engineers, on the other hand, prefer having a workspace enclosed in floor-to-ceiling solid walls rather than 5-0" or 7'-0" high partitions. Triangulation of data and analysis help to explain the specific design component the engineers may be targeting. The Gulfstream project suggests that the perceived acoustical value associated with a wall or partition is being targeted--not the particular height.

Additionally, ethnographic data and analysis clarify group differences. As previously stated, Production engineers participating in the study are predominantly housed in workspaces with 5'-0" high partitions and are experiencing acoustical problems with these partitions. Manufacturing engineers, on the other hand, are located predominantly in open areas without partitions and, for the most part, have not used the 5'-0" high partitions in their area. Manufacturing engineers, instead, are experiencing acoustical and visual problems with their open area.

The findings suggest that the user perceives the acoustical property associated with a wall or partition as more important in regulating privacy than its particular height, a visual property. The Gulfstream findings shed further light on the research of Sundstrom, Town, Brown, et al. (1982). It may be that workers across ranks gain their greatest perceived privacy in individual offices enclosed by floor-to-ceiling walls or partitions and accompanied by doors, because of the perceived acoustical property workers associate with floor-to-ceiling walls or partitions--not the particular height.

The Gulfstream findings also indirectly support the research of Sundstrom, Town, and Brown, et al. regarding the door. The engineers associate HAVING A DOOR with more activites directly related to acoustical and visual privacy than the 5'-0" or 7'-0" high partitions or floor-to-ceiling solid walls. (They associate HAVING A DOOR with six out of the seven activities listed in the Beliefs Matrix.) The engineers also rank HAVING A DOOR as more important than these barriers. (Having a door is ranked eleventh in importance by Production engineers and twelfth in importance by Manufacturing engineers.) In addition to the perceived acoustical and visual value, the engineers may perceive the door as a symbolic device enabling them to regulate privacy through their own locales. A closed door in American culture typically indicates that the office occupant does not wish to be disturbed. (See Hall, 1983.)

CONCLUSION

The Heuristic Elicitation Methodolgy provides a strategy for eliciting, linking, and analyzing several different types of data. The information gathered provides considerable support for the environmental, social, and behavioral mechanisms classified in the model of privacy regulation developed for this study, and extends certain associated theoretical considerations. Analysis of data collected from Gulfstream engineers provides insight on design features, devised or deployed by designers, that the engineers associate with privacy regulation, as well as where privacy fits into the engineers' overall perception of what is important in their work environments.

The three hypotheses generated from the Domain Definition provide certain insights and understanding of privacy regulators that are directly applicable to space planning standards and design practices at Gulfstream and, pending further research, perhaps to a variety of other situations.

The final chapter, "Conclusions," evaluates the study in terms of the three research goals:

(1) To refine and extend theory on the architectural correlates of privacy in the work environment.

(2) To demonstrate the usefulness of the Heuristic Elicitation Methodology in targeting user needs and purposes.

(3) To provide a model of the social, behavioral, and environmental mechanisms operating in the context of culture that are employed to regulate privacy in work environments. The model guides the development of a descriptive system identifying physical elements of design, devised or deployed by designers, that users perceive as regulating privacy.

The final chapter also assesses the study's potential impact on the management of privacy in today's automated office, and implications of the research.

CHAPTER VIII

CONCLUSIONS

The final chapter evaluates the three research goals in relation to the specific objective and test challenge of the study. The objective was to identify physical elements of design devised or deployed by designers that users perceive as regulating privacy in the work environment. The test challenge evaluated the internal validity of architectural correlates of privacy identified by Sundstrom, Town, and Brown, et al., (1982). The chapter also assesses the study's potential impact on the management of privacy in the work environment, and implications of the research.

REFINEMENT AND EXTENSION OF THEORY AND MODEL DEVELOPMENT

Theoretical Construct

Complexities of privacy regulation were clarified through theory and systematic information generated through the Heuristic Elicitation Methodology. The conceptual framework of privacy regulation presented in the model extends theoretical considerations regarding social, behavioral, and environmental mechanisms operating within the context of culture that are employed to regulate privacy in work environments. The model expands the theoretical framework conceptualized by Altman (1975; Altman and Chemers, 1980) to include environmental stimuli and additional privacy regulating mechanisms. The model posits a comprehensive framework of privacy regulation and suggests a more detailed method for classifying regulatory characteristics. It draws upon the research of Altman (1975, 1976, 1977); Altman and Chemers (1980); Hall (1966); Justa and Golan (1977); Rapoport (1976); Sundstrom (1982, 1985, 1986); Sundstrom, et al. (1980); Sundstrom, Herbert, and Brown (1982); Sundstrom, Town, and Brown, et al. (1982); and Zeisel (1984).

Environmental mechanisms classified in the model were substantiated through a descriptive system of privacy regulation elicited during the Domain Definition and identified through content analysis. Information was also elicited on culturally-conditioned social and business practices and physical elements that enable users themselves to regulate privacy through their own locales. Even though the focus of the study examines environmental mechanisms, these social and behavioral mechanisms were identified in order to corroborate the model guiding the research.

Specific Objective

The Gulfstream findings provide a balanced perspective of physical elements devised or deployed by designers that Gulfstream engineers perceive as regulating privacy in their work environments. The engineers associate eight out of seventeen design items utilized in the matrix with privacy regulation. Certain field characteristics and barriers are considered important for regulating activities dealing with acoustical and visual privacy. The engineers consider having minimal traffic routed through the worker's area and the workspace located away from the main traffic flow to be important <u>field characteristics</u> for regulating privacy. The engineers also consider having a workspace with 5'-0" high partitions, 7'-0" high partitions, floor-to-ceiling solid walls, a door, a conference room, and a partition window with levelor blinds in the worker's cubicle to be important <u>barriers</u> for regulating privacy.

<u>Theoretical Considerations Concerning Physical Elements Devised or Deployed by Designers</u>

Three hypotheses evolved from major variables elicited during the Domain Definition and identified through content analysis. Linking the qualitative and quantitative data and analyses provided support for the hypotheses, and further extends several theoretical considerations:

Theoretical Consideration Relating to Hypothesis 1

<u>Design features that are necessary to perform overall basic job functions appear to be more important to the user in work environments than design features associated with privacy regulation</u>.

The Gulfstream findings determined where privacy fits into the engineers' overall perception of what is important in their work environments. Design items associated with privacy regulation are <u>not</u> perceived by Gulfstream engineers as the most important design items. Those design items that are necessary to perform basic job functions are considered most important: having an adequate worksurface to spread out drawings; adequate storage; easy access to reference materials; and groups that work together located close together. These design items are indicative of the particular job requirements at Gulfstream and are not applicable to all settings (e.g., obviously, not all office workers review drawings).

The engineers rank several design items associated with privacy regulation immediately after the four design items that are seen as necessary to perform basic job functions. Having minimal traffic routed through the worker's area, a conference room, and the workspace located away from the main traffic flow are ranked fifth, sixth, and seventh by Production engineers. The two field characteristics are ranked fifth and sixth by Manufacturing engineers. The findings suggest that once the design features are provided that are necessary to perform basic job functions, then certain design features associated with privacy regulation take precedence.

Theoretical Consideration Relating to Hypothesis 2

<u>Field characteristics, in particular "orientation of the workspace," appear to be more important in regulating privacy in work environments than barriers, such as walls or partitions</u>.

Field characteristics associated with privacy regulation are considered more important to Gulfstream engineers than barriers associated with privacy regulation. The two field characteristics, having minimal traffic routed through the worker's area and the workspace located away from the main traffic flow are ranked as more important than the barriers. Each of these characteristics deals with orientation of the workspace, and stresses the importance of functional distance. Responses by the engineers indicate that loss in production time and potential mistakes occur due to visual and acoustical distractions. These very likely are impeding job performance. The orientation of the engineers' current workspaces is an environmental hindrance contributing to visual and acoustical distractions. The positioning of fixed and semi-fixed design features in the workspaces affects the line of vision and contributes to acoustical problems (e.g., some of the partitions open onto traffic corridors in Production Engineering). (See Mehrabian, 1976; and Sundstrom, 1985 for more discussion on the line of vision and social interaction.)

Inadequate acoustical control in work environments may also affect employee health. Hedge (1988) conducted a study assessing demographic, environmental, psychological, and occupational influences on health in six office buildings in the United Kingdom. The results of his study suggest that work-related illness is strongly associated with self-reported job stress and negative perceptions about the physical environment, including office noise.

As stated earlier, Herbert (1980) recommends using a combination of free-standing barriers, sound-absorbent building finishes, sound masking, and proper distancing between workspaces in order to provide the necessary acoustical and visual control needed in the open-plan office. The Gulfstream project demonstrates that proper orientation of the workspace is another design component that should be included in this combination for optimum performance.

On a different level of analysis, communication technologies complicate the problem of providing proper acoustical and visual control in open-plan designs. Sutherland (cited in "Officing: An International Round Table on Intelligent Buildings," 1988) points out:

> The facility manager seldom has sufficient experience or breadth of responsibility to handle the diverse technologies--computers, telecommunications, etc.--which must work together. (p. 7)

Facility managers and designers are confronted with the possible and probable repercussions of new technologies on such design issues as spatial arrangements and management, individual work and group workplaces, storage and archiving spaces, and spaces required for mechanical systems (Goumain, 1989). The facility planners at Gulfstream are confronted with similar issues. Radical change, however, has not occurred in the physical setting of the work environment to accommodate the new technologies at Gulfstream. Their space planning standards and design practices are indicative of a 1970's approach to the open-plan office. This supports Rand's (1986) general observation that no significant changes have occurred in spatial layouts of work environments to reflect the new technologies. For the most part, facility management and design strategies continue to "establish adjacencies between departments based on how often employees meet or communicate in person or on the phone" (p. 106).

He argues that radical change in the physical setting of the work environment to reflect available technology has met with opposition because "patterns of resistance are still too great for new organizational ideas to take hold" (p. 106).

Theoretical Consideration Relating to Hypothesis 3

The acoustical property associated with a wall or partition appears to be perceived by the user as more important in regulating privacy in work environments than the visual property associated with the height of a wall or partition.

Gulfstream engineers seem to judge barriers, such as walls or partitions, in terms of their perceived acoustical property for regulating privacy more so than the particular height of the barrier, a visual property. This project empirically validates the relative importance of acoustical and visual properties in regulating privacy, as perceived by the user. The eight design items listed in the Beliefs Matrix differ in their degree of association with the seven activities that directly relate to acoustical and visual privacy. The engineers associate 5'-0" high partitions with regulating visual privacy, but not acoustical privacy. The 7'-0" high partitions are associated with three of the activities dealing with both acoustical and visual privacy. Finally, the floor-to-ceiling solid walls are associated with five of the activities dealing with acoustical privacy, but not visual privacy.

The Gulfstream project sheds further light on the research of Sundstrom, Town, Brown, et al., (1982). It may be that workers across ranks gain their greatest perceived privacy in individual offices enclosed by floor-to-ceiling walls or partitions and accompanied by doors, because of the acoustical value associated with floor-to-ceiling walls or partitions--not the particular height. The expense of providing individual offices enclosed by floor-to-ceiling solid walls or floor-to-ceiling partitions rather than shorter partitions (e.g., 5'-0" or 7'-0" high) may not be necessary to achieve desired privacy levels, so long as the design components needed to control acoustical privacy are provided.

This potential cost savings should be weighed against other factors when assessing the benefits of open-plan designs. Research indicates that workers and clients or customers attach a symbolic value, labelled "privacy," to physical characteristics of the workplace. This may necessitate the use of floor-to-ceiling solid walls for certain ranks. A workspace enclosed by floor-to-ceiling solid walls may not be necessary to achieve visual and acoustical privacy, but appears to contribute to the symbolic value of privacy. Brandt (1987) argues that privacy, as a status symbol, is an important goal for many office workers, especially at management levels, despite the context of new technologies and "state-of-the art" offices. (See also Konar, et al., 1982; and Sommer and Steiner, 1988.) The amount of privacy typically corresponds to the individual's formal rank in an organizational hierarchy, with higher ranks having acquired more privacy privileges. Landmark Bancshares Corporation, a multibank holding company, recently redesigned its banking center and accommodated organizational hierarchy--a conventional design practice.

Individual offices were designed for executives, department heads, and officers; whereas semi-private workstations with shorter partitions were designed for support staff members (Dubbs, 1990).

The privacy needs of the client or customer visiting the corporation also should be weighed. Brandt (1987) cites the customer's or client's point of view expressed by Allied Bancshares:

> We used open-plan at Allied Bancshares in the customer banking areas...and found that even if there wasn't sound transmission between workstations, customers still perceived a lack of privacy. It didn't help that a conference room was nearby, customers wanted to talk to someone 'in charge' whose office had four walls and a door. (p. 13)

Corporations will continue to deal with this issue, as they weigh potential cost savings (such as deploying shorter partitions) against user satisfaction of the workplace. The office of environmental research at Steelcase, Inc. reports that recent research indicates fewer jobs at the middle management level due to the increase in technology. Technology can integrate the filtering and reformatting of information that middle management previously provided. As a result, fewer people who are products of the baby boom will have the same opportunity to move up the "corporate ladder." Steelcase, Inc. proposes that corporations will need to devise other ways to satisfy this group, whose traditional work ethic leads them to expect success. Providing a pleasant work environment is one of the solutions Steelcase, Inc. recommends to increase "personal satisfaction" with the job (Glover, 1986; see also Sundstrom, et al., 1980). Providing a pleasant work environment also sells more product for makers of office furniture and partitions.

The potential cost savings of shorter partitions in lieu of floor-to-ceiling solid walls should also be assessed in terms of the overall space efficiency of open-plan designs (defined here as cost per square foot and furniture and equipment cost) as well as cost paybacks to the organization (Brandt, 1987; Ventre, 1986b).

Test Challenge

The test challenge evaluated the internal validity of the architectural correlates of privacy identified by Sundstrom, Town, and Brown, et al., (1982). This is one of the first empirical studies to isolate architectural correlates of privacy. The investigators' examination of physical elements devised or deployed by designers to regulate privacy provided theoretical grounding for the Gulfstream project. A comparative analysis follows that attempts to provide further insight on theory and method applicable to privacy regulation in work environments.

Few of the design items evaluated in the 1982 research were elicited in the Domain Definition or identified through content analysis in the Gulfstream study. The particular environments and job types may contribute to the different design items examined. The 1982 environment is a university setting; the environment for the test challenge is an aerospace industrial setting. Methological differences may also contribute to the different design items examined. In the Gulfstream study, design subjects, the users of the environments studied. All stages of elicitation incorporated the language of respondents. In the 1982 study, design items were predetermined by the investigators. Based on Gulfstream findings, design items associated with privacy regulation in the 1982 study do not appear to exhaust the range of respondent perceptions about privacy regulation. Also, the items examined in the 1982 study may not be in the respondents' language. Consequently, the meaning of privacy as a concept may not be shared by the respondents and investigators.

These methodological differences reflect a positivist versus an interpretivist approach. The Heuristic Elicitation Methodology employed in the Gulfstream study is an interpretivist approach. Environmental design researchers are challenging scholars to transcend the limits of positivism since positivist approaches are not amenable to the articulation of user needs and purposes (Levy, 1987; Patricios, 1987; Ventre, 1986a; Weisman, 1983).

The Gulfsteam findings are more specific than the 1982 study. This facilitates their use in facility design and management strategies. The 1982 study addresses both barriers and field characteristics, but the variables evaluated are sometimes too general for design purposes. For example, the 1982 study measured the association of design items NUMBER OF ENCLOSED SIDES, AMOUNT OF FLOORSPACE, and DISTANCE TO COMMON ENTRANCE with privacy. Interestingly, the 1982 study does not measure the particular height of moveable partitions in the workspace, only the workspace's number of enclosed sides. This design item was not elicited by Gulfstream engineers, even though partitions are arranged in various configurations and numbers in Production Engineering. Instead, information was consistently elicited on workspaces enclosed by partitions of varying heights. The 1982 study generally addresses square footage and distancing in work environments, but not functional distance or orientation of the workspace. The Gulfstream findings indicate that this field characteristic appears to be a key environmental mechanism regulating privacy. The use of an interpretivist approach, such as the HEM, decreases the likelihood of overlooking such significant attributes of the domain being examined.

USEFULNESS OF THE HEURISTIC ELICITATION METHODOLOGY

The present study demonstrates the usefulness and adaptability of the Heuristic Elicitation Methodology (HEM) to environmental design research. The HEM, guided by an interpretivist philosophy, has not been utilized to examine privacy in the work environment to date. Except for studies conducted by Harding and his colleagues, this method has not been used in environmental design research as a whole. (See Clement, Lammers, et al., 1973; Harding, 1979, 1988; Harding, Clement, and Lammers, 1972b; Wittman, et al, 1974.) The HEM provides a strategy for developing a fairly definitive interpretation (i.e., understanding) about physical elements devised or deployed by designers that users perceive as regulating privacy. The information gathered is specific for facility design and management purposes. Providers of office equipment/furnishings and products/services can use the knowledge gained to enhance the management of privacy at Gulfstream. This knowledge may also be applicable to other work environments, pending further research.

The HEM's strength lies in its ability to establish internal validity. As a cognitive ethnographic method, the "nature of ethnography makes it potentially quite strong in validity, especially internal validity" (Eisenhart, 1985, p. 19; see also Denzin, 1978). No single method solves the problem of rival factors. To this end, HEM elicitation procedures helped to triangulate the collection and analysis of qualitative and quantitative data at Gulfstream. This also decreased the reliance on statistical inference alone to rule out spuriousness.

The HEM emphasizes the personal constructs of the research subjects, the users of the environments examined. Awareness, cohesion, and participation are enhanced since categories are respondent-generated and data respondent-categorized rather than investigator-generated and investigator-categorized. This is the component in which privacy research is consistently weak. Failure to expose the personal constructs of the user is the major limit of privacy research, and causes potential problems with the instrumentation. This threatens internal validity. (Note that user constructs may be specific to a particular sub-culture, site, locality, or setting. Interpretation requires understanding.)

User-oriented design is gaining greater attention in work environments as technology becomes increasingly integrated (Sutherland, cited in "Officing: An International Round Table on Intelligent Buildings," 1988). Harding (1979) compares the similarity of participatory design concerned with user input in environmental design research to the orientation of cognitive anthropology, from which the HEM is derived: "The concern is with determining the culturally-defined categories of a domain rather than imposing an investigator-defined set of categories in a situation" (p.3). Determining the personal constructs of users complements the "human touch" that is necessary in facility planning of work environments. Davis, Becker, et al., (1985) explain:

> The consequences of technological change are not always consistent or predictable....Whatever the changes which have arrived and are yet to come, they must be looked at together in three independent domains: people, places, and technology. (p. 39)

CRS Sirrine, Inc. of Houston and Matsushita Electric Works, Ltd. of Osaka, held an international round table on the owners, users, and providers of intelligent buildings ("Officing: An International Round Table on Intelligent Buildings," 1988). Sutherland, Vice President and Director of Officing at CRS Sirrine, Inc., elaborates:

> As technology becomes increasingly integrated (as the computer and the telephone have been doing for the past decade), I believe that enterprises will be forced to create new technology planning models which address ends instead of means. These ends lead to concepts like amenity or security rather than technologies like telephones, personal computers or systems furniture. Furthermore, ends-oriented technology planning will finally integrate the one key ingredient which is missing from most current approaches: the human touch. (pp. 7-8)

This insight reaches global proportions. The New Office Promotion Association organized by the Ministry of International Trade and Industry in Japan proposes that the office should be designed not just as a work space, but as a living space where "more than 50% of workers spend more than one fifth of their lifetime" (Tsukio, cited in "Officing: An International Round Table on Intelligent Buildings," p. 10).

Potential Time Constraints

The short time constraints mandated by corporate culture increase the difficulty of establishing reliability and validity in field settings. Although the HEM is not a device providing immediate answers, it allows for completion of data collection faster than the long-term field work necessary for "true" ethnography, without threatening reliability or validity. Harding and Livesay (1984) contend that the HEM is moving in the direction of allowing "completion of data collection fast enough so that policy recommendations arising out of the research are not irrelevant because decisions had to be made in a short time period" (p. 73).

Any phase of the HEM can be used individually and stand alone as a separate investigation. Harding (1974) stresses that, at present, there is greater utility if all phases of a study are completed. Use of the HEM procedures sometimes results in lengthy analyses since one goal of the methodology is to elicit all information held by respondents about a particular domain in the process of refining and extending theory grounded in data. The need to collect exhaustive data in particular domains of environmental design research depends upon the research question and project goals. The particular circumstances of the Gulfstream project necessitated a lengthy analysis:

(1) Minimal empirical information exists on the architectural correlates of privacy. For the Gulfstream study, eliciting an exhaustive cognitive data set provided a better understanding of the structure of the privacy domain and regulatory mechanisms.

(2) In addition to information on privacy issues, the lengthy analysis provides Gulfstream Aerospace Corporation with a balanced perspective of what their employees think about their work environments.

The Domain analysis, conducted during Stage I of the Gulftream project, took 80 hours of production time and produced 56 single-spaced pages of information. (See Appendices A and B.) Social, behavioral, and environmental mechanisms regulating privacy were then targeted in the taxonomic and componential analyses. Each analysis required 21 hours to complete. The total production time for the content analysis would have been approximately 18-20 hours, if the research goal had only been to target environmental mechanisms. Data entry and analysis took minimal time during Stage II of the HEM. A computer program, utilizing Lotus release 2.1, was designed for this purpose. Data entry for statistical analysis required 2 and 1/2 hours for the Beliefs Matrix (50 respondents) and Preference Ranking (89 respondents) questionnaires.

POTENTIAL LIMITATIONS OF THE PROJECT

The Gulfstream project has potential limitations regarding external reliability and validity. The nature of field settings with dynamic, changing contexts makes replication of procedures in similar social and physical contexts difficult. The study attempts to facilitate project duplication by providing detailed information on theoretical constructs, the social conditions of the study, sample, methods of data collection and analysis, and role of the researcher. As a case study, the Gulfstream findings can possibly be generalized to other settings whose work environments and job types are similar. Further research is required, however, in order to generalize to different work environments and job types.

Three special conditions in the Gulfstream study warrant attention, even though they do not appear to threaten the internal validity of the study. First, Gulfstream experienced layoffs during the second phase of elicitation (the Beliefs Matrix and Preference Ranking). Employee morale was affected. This is not considered a rival factor in the study as neither the Beliefs Matrix nor the Preference Ranking was designed to elicit negative information. Only relationships and preferences were examined during this phase of elicitation.

Second, experimental mortality occurred due to the reduction in personnel. Thirty-nine Production engineers participated in the Preference Ranking part of the survey rather than the fifty originally anticipated. (Fifty Manufacturing engineers participated.) The decreased sample is not considered a rival factor as the sample size is also the population size in Production Engineering within a certain range of occupational rank.

Finally, the investigator did not have access to personnel records, which necessitated Gulfstream making the sample selection. Precautions were taken to guard against potential selection bias. Gulfstream was instructed verbally and in writing on requirements for sample selection. The research instruments also included demographic questions in order to verify sample representativeness.

IMPLICATIONS FOR FUTURE RESEARCH

The present study lays the foundation for future research on the cultural variability of privacy. "Cultural meaning structures," or the rules of correspondence relating behavior to socially ascribed meanings were identified. The knowledge gained provides a framework for developing and then communicating culturally-sensitive space planning standards and design practices. The globalization of what were once national industries has brought a crisis in corporate communication: people are dealing with other cultures continually. But reliable, systematic information on privacy regulation in industrialized countries is not available. If culturally-sensitive space planning standards reduce the need for changes induced by cultural incompatibility, then they could help control alteration costs.

The Heuristic Elicitation Methodology offers a viable alternative to a positivist approach for describing and developing culturally appropriate structures and spaces. "Culturally appropriate" is used broadly here to refer to the compatibility of an introduced element with the socio-cultural patterns, goals, values, and circumstances (context) characteristic of the populations to which the element is introduced (Harding, 1979). The culturally specific data obtained through the HEM provide a basis to examine the acceptability of new architectural correlates of privacy which might be introduced in work environments, both within the United States and abroad.

CONCLUSION

Specific to Gulfstream, the engineers' responses indicated that loss in production time and potential mistakes occur due to visual and acoustical distractions. This has economic ramifications, especially where costly parts are involved. For example, Manufacturing engineers indicated that some of the parts they work with easily cost $20,000 a piece. Future facility plans include providing partitions for the bull pen office in Manufacturing Engineering. Gulfstream space planning standards can incorporate the knowledge gained from the study to design a partition layout that is "compatible" with user needs and purposes. Successfully managing privacy can enhance the Corporation's effectiveness, with potentially large cost savings.

Privacy regulation operates in networks and patterns of dependencies. It is not a unidimensional concept with an easily identifiable class of empirical referents in current literature.

The present study attempts to clarify both the complexity of privacy as a concept and its regulation. The study tests conceptual/ theoretical notions still in their formulative stage, whose ultimate value is the further refinement of privacy regulation, conceptually and operationally. In a broader context, the study stresses the importance of encompassing human values and technology in environmental design research. Ideally, tomorrow's workplace is the intelligent building which is socially and culturally appropriate for the individuals for whom it is intended.

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APPENDIX A

DOMAIN ANALYSIS
PRODUCTION ENGINEERING

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
writing information writing of memos writing memos write memos write procedures writing reports, analysis, and memos reading read all the manuals that we write, more revising old documents rather than writing new ones check vendor and technical manuals, we check to make sure [they] are still valid review reports schedule work approve reports, vendor qualifications reports put together five year and yearly manpower reports personnel planning planning activities that everybody should be doing have to do a lot of checking of what work is being done [in progress] --I serve as the guy that asks the question contour development activities issue job changes correct time changes--fill out the paperwork do budget adjustments do monthly accruals to comptroller to get accounts straight-- see how much money we made in a month/year time cards to review I have people coming in with Gulfstream--[I answer] requests for information all the time conference calls with [outside] vendors phone conversations phone, twenty to thirty phone calls per day a lot of work on the phone	**is a kind of**	**job activity**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
phone calls, including administrative and technical types of calls	is a kind of	job activity (continued)
telephone calls		
taking messages for other two people who are gone, can't use phone mail, not quick enough--quicker to just give them messages		
review and sign drawings and specifications		
revisions of specifications, test procedures, and specifications themselves		
specifications review		
review new designs		
review of wiring diagrams and design reviews		
can approve mechanical systems for FAA		
look at engineering drawings		
review drawings, small ones		
CADAM		
respond to messages on machine or computer		
computer work, including software on airplane		
I answer day-to-day questions regarding computers--people visit you		
try to put information on computers		
computer runs		
communicate with electronic mail		
supervisory functions		
supervisory		
handle outside consultant contracts		
directing work that people do		
coordinate amongst groups--documents have to meet engineering requirements, [and] production requirements--we see everybody in our group		
hold meetings in my office, one to two [people] at the most		
having little meetings in our group		
administrative stuff for people		
dealing with technical problems, problem solving		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
yearly evaluations of people [written and verbal] review with personnel privately review personnel privately review personnel evaluations with coop students evaluations of workers	**is a kind of**	**job activity (continued)**
l-shaped work space l-shaped desk like l-shaped arrangement l-shaped work surface l-shaped arrangement work areas for Avionics Electrical Engineering allowing them to lay stuff out -- it just works better for us, and everything is in close proximity to his needs in l-shaped arrangement convenient drafting table and desk combination [l-shaped] top surfaces at a maximum without intruding into space [floorspace] desk in front of me, worksurface behind me [cubicles] it's a good idea for some people, it depends on type of work you do in my environment, more openness --other areas may want more individualized environments	**is a kind of**	**preferred worksurface layout**
want to have visual contact with your people	**is a kind of**	**supervision need**
not being able to see everyone that works for me having individual cubicles can't readily see the people cublicles can become hiding places, can't really see people like young draftsmen who might get into play mode--can affect efficiency of the group sometimes	**is a kind of**	**supervision problem**
would like more storage more storage needed lots of storage need more storage space	**is a kind of**	**storage need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
more storage space plenty of file cabinets adequate filing space more shelving and more filing storage space needed personal drawer bookshelf to personalize work space four built-in bookshelves that open five drawer file cabinet, lateral and ganged [attached to partition] adequate space for reference material and documents	**is a kind of**	**storage need (continued)**
lack of storage space need more storage space lack of wall shelves, which would give me more floorspace area is not as neatly kept as it should be, I think that's partly due to a lack of file space and also some individuals are neater than others [some of technical material], it's kept on piles on the floor because we're in a borrowed area, files belong to other people--area used to be their area and [they] still use those files	**is a kind of**	**storage problem**
like everything to be able to be locked up I like those overhead cabinets that lock three lock-in upper cabinets over the desk, a locked cabinet shelf sufficient file space and cabinet space that was lockable	**is a kind of**	**security need**
open cabinets open files	**is a kind of**	**storage security problem**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
no lockable space right now, cabinets could be fitted for lockability not enough cabinet space, locked and closed--given a lot of data, some of it may be proprietary, left in my care	**is a kind of**	**storage security problem (continued)**
privacy--ability to converse privately with staff more privacy privacy privacy--[we] don't always want one of the five groups to know problems with another group nice to have a little privacy private communication [privacy] really important when dealing with people problems ability to have conversations in private regarding problems with staff and customers their [supervisors'] daily scope of work requires a degree of privacy-- Group Heads have lots of people to interact with on a daily basis--[Upper Management] does not interact with that many concentration able to concentrate can concentrate have to be able to really concentrate when it's quiet, when you don't have the distractions of other people in the area and out in the hallway you need to be able to devote a lot of concentration to what it is you're involved with at times [privacy is important when] working on critical memos, reports, procedures that require a couple of hours doesn't have constant interruptions avoid interruptions no interruptions lack of interruptions	**is a kind of**	**privacy need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
noise not too bad right now	**is a kind of**	**privacy need (continued)**
I don't have confidential conversations to deal with	**is a kind of**	**non privacy need**
lack of privacy if trying to be private, problem finding a place to go when I want to review somebody, I have to go find a full walled office--confidential conversations can be overheard [we] don't have privacy to see people at different times and can't get your job done, we end up serving as a referree rather than serving as a coordinator of information upper management is not functioning with all the limitations that their supervisors are functioning with, they [upper management] have all the privacy they need not enough places to meet privately with people can't look at personnel files comfortably as anyone can walk up behind me not a problem for me, but my boss has a glass section that looks directly on him--he feels he's being watched constantly lack of conference room space [for meetings] conference rooms are not always available for privacy go to conference room when have confidential conversations, usually can find conference room available--not a problem some conversations will be discouraged, have to go looking for a conference room [where there is more privacy] may be talking about something you don't want other people to know about, picking up on bits and pieces--privacy problems--type of data you don't want to get out of house, proprietary [customers are in and out, vendors, and competitors] not too many confidential converstations on my boss's speaker phone	**is a kind of**	**privacy problem**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
so wide open [office] in the mainstream, can't talk in a normal level--everybody and his brother is listening to what's going on	**is a kind of**	**privacy problem (continued)**
problem is overhearing three different conversations going on		
with no door, if I have to leave for something, I have to start all over again		
that I do not have a door		
no door		
no door makes me more accessible		
walls do not go all the way up		
sound carries--need more privacy		
sound carries		
noise outside--typewriters, keys of computers clicking, ticking clock [is a] monotonous noise		
noise level--hard to concentrate		
noise of some of the printers, also photocopy machine		
noise discourages your train of thought		
noise distraction		
noise, when trying to put something together in your mind, you can get distracted		
like that telephone, I can't imagine them allowing them to have the telephone so loud		
you just can't make those calls here, you just about have to go and present yourself to your person		
no real privacy on phone--no real way to keep things proprietary		
disruptions		
interruptions		
constant interruptions, but that's part of my job		
constant interruptions		
constant interruptions, [it's] not private because I can hear over the wall		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
interruptions whenever somebody comes to your desk--system is not all that secure, so if there is a sensitive bit of information that you are talking about, you have to be careful	**is a kind of**	**privacy problem (continued)**
hard to concentrate		
people overhear phone conversations		
can't get access to other rooms like the conference room, so ends up everyone hearing what everyone else is doing		
guys that can hear my conversations		
openness of office--[if] it's a private matter, when I fill out the form anyone can come up to my desk at any time		
being too wide open, sitting on top of one another--too open and too accessible, distracting		
being too wide open, trying to understand why the guy did what he did, trying to get inside his head, [I] get engrossed, lose a lot of time with distractions--phone ringing off the hook and speaker phone [with] two way conversations		
without partitions, at major corridors, traffic going by [causes] lots of interruptions		
because of bare walls, acoustics are poor		
shared a small office at my last place [respondent felt this lacked privacy]		
an office, except it [partitions] doesn't go all the way up		
there's a coffee pot--people like to hold conferences in the aisleways		
[cubicles] it's a good idea for some people, it depends on type of work you do	**is a way to regulate**	**privacy through environmental mechanisms**
cubicles are a good idea for some people, depends on the type of work, a technical space might really need the privacy		
in a management job, more soundproof		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
can isolate myself to a degree due to partitions and sound proofing, it's private enough	**is a way to regulate**	**privacy through environmental mechanisms (continued)**
a carroll for anybody to get away from the phone [and] their work area		
a lot quieter with modular panels		
individualized environments		
privacy--doors, walls, an isolated area		
[to be] in enclosure without other disturbances		
my own private office		
my private office, not sitting next to a guy who's going to hear my conversation		
private office--floor-to-ceiling walls and door for concentration		
own private office [with] floor-to-ceiling walls and door		
room [enough] for little meetings		
location [of office] on perimeter, able to achieve some acoustical privacy this way		
not in the mainstream [cubicle], I will not be interrupted that much		
opposed to a completely open [office], I liked the partitions [5'H]--[They] cushion enough sound so you can concentrate		
easy to carry on a conversation, the place next to me is empty, otherwise it would be a disadvantage		
almost every engineer had their own office		
cubicles with partitions affords some privacy to conduct your business		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
at minimum possibly four walls with door of some type, at least for Section Head or above 80" H partitions with glass panels, sometimes close [them] 80" H [partitions]--with 5'H, people look over and shoot the breeze higher walls--full walls floor-to-ceiling solid wall with door prefer floor-to-ceiling partitions wish had floor-to-ceiling walls floor-to-ceiling walls because I deal with personnel walls floor-to-ceiling all walls should be to the ceiling solid wall with a door door it would have a door window control with levelor blinds clear partitions with the blinds window allows me to see you, provides a warning system	**is a way to regulate**	**privacy through environmental mechanisms (continued)**
open door policy it would be at your discretion [to keep door open/closed] under [management] supervision other than that [privacy needs], you should have an open door policy --not be locked up secretary thinks nothing of interrupting those in cubicle with glass [boss's office] if she doesn't like you they recognize that this is your space [Stress area]--implied manners not to talk too loudly closing door to let people know I don't want interruptions closing door to let people know I don't want to be disturbed	**is a way to regulate**	**privacy through social mechanisms**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
only sharing aisle area [in cubicle], you're much less prone to hear conversations or be interrupted as [your] back is to them--because I'm out of the line of vision--visual cues are a very big part of it	**is a way to regulate**	**privacy through behavioral mechanisms**
Verbal [evaluations of people], try to find a more private area		
if I have to [do] scheduling of work or evaluations, I go to the library where it's quiet and no interruptions		
with real sensitive calls, [you] may have to lower your voice--our job doesn't require too many sensitive calls		
go to conference room for confidential talks		
can modify some visuals with blinds, but I don't usually bother because [there's] no door		
the noise is sometimes a good thing for stimulation for more boring part [of reading]	**is a way to**	**increase environmental load**
open environment is good--people come right over and talk	**is a way to**	**encourage communication**
in my environment, more openness --other areas may want more		
comfortable surroundings encourage more comfortable communications		
communication is vital, put them in open architecture to reflect our job duties		
enclose this area, but don't enclose working spaces of the people, they are working together and [to be be] accessible to each other		
some sort of intercom system that runs through the partitions, [so] you are able to buzz where you are		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
I feel we should go to an open architecture, it's more of a team effort to reflect our work better [I] like openness with the three people immediately adjacent to me --increased communication able to air problems better [in open arrangement of cubicles]	**is a way to**	**increase communication (continued)**
can't see if someone is in here at Gulfstream, so walk all the way around to workstation, and phone doesn't help, [person] could be just around the corner height of cubes, [5'H--doesn't like] prefer floor to ceiling partitions, I have 80" H now avoid open office modular panels opt for the taller partitions [so] everybody is on the same level, 80" H ideal for me partition not going all the way up to the ceiling not being able to find who you are looking for--you can't see over partitions [5'H and 80" H] have it so you could see everybody near enough smaller [height] partitions to see if people were around instead of having to walk all the way to person's cubicle interaction activity fosters [an] idea, don't want people off the streets, but want my own people diffused lights are less distracting, even to read [nonverbal] expressions can always reach over and knock on a cubicle wall and say 'Hey Bruce, what do you got?'	**is a kind of**	**problem with partition height**
[none elicited]	**is a kind of**	**problem with lack of partitions**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
several windows, one has chalkboard [over it] and another is papered up [with] clear partitions, if blinds were not closed or not there, there is no privacy if you go to see someone, everyone knows you are there large open clear panels [without blinds] --that is a distraction not only to you but to people walking by	**is a kind of**	**problem with partition windows**
modular furniture, but [I] had much more storage space than current [environment at former employment] cubicle concept itself is good I like the modular furniture I like the modular furniture and equipment [shelving] modular furniture has improved when it used to be wide open phones and computers wired through modular furniture would prefer [being seated] across from each other [desk location] it's sort of semiprivate, set up pretty good, giving us some privacy but also allows us to get our attention fairly quickly	**is a kind of**	**preferred f&e in personal work area**
no guest chairs no guest seating lack of guest seating--also true with colleague in same workstation modular is fixed in space, can't make any design changes u-shaped arrangement [with] no table between us [my] back is to opening, and I can't see who's coming in having my back to the door lack of conference table [during personnel reviews], it's like they're invading my turf--I can't drop the line for management [authority issue]	**is a kind of**	**f&e problem in personal work area**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
chalkboard [white marker board]	**is a kind of**	**vertical worksurface need**
chalkboard, about 30" x 30", with grease pens [white marker board]		
blackboard [white marker board]		
large white board [marker board]		
my stick board, that was a place I put things if I needed to remember		
at least one stickboard		
stickboard behind desk		
big bulletin board in front of my desk [stickboard]		
plenty of work area	**is a kind of**	**horizontal worksurface need**
table large enough to lay drawings out on--separate table to leave drawings on once start reviewing [without cluttering up desk]		
ample table, large enough to lay drawings out--larger than now		
both desk and worksurface to be at 6'long		
ample work area		
more workspace to lay plans on--increase depth of counter plus increase length		
need a place to layout drawings and specifications for several people to look at at once		
huge desk		
suitable working surfaces		
fact that you can lay it [drawings] out so that you can see the whole thing		
ability to be able to open and spread out what I work with		
adequate work surface for multiple projects and multiple tasks		
adequate reference tables		
conference tables		
conference table for meetings		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
plenty of worksurfaces, in addition to table [where drawings are layed out] table space, desk space more than adequate desk area, place for computer plenty of table space plenty of table top board space ample work top area work surface to lay drawings out on undertray [computer] keyboard holder [so I] can put keyboard away	**is a kind of**	**horizontal worksurface need (continued)**
space problems of where [blackboard] located, can't reach it and can't see it	**is a kind of**	**problem with vertical worksurface layout**
lack of space if drawings too big, I have to go somewhere else [to review drawings] need somewhere to put drawings, right now have only limited work surface lack of work surface don't have anything to spread out on don't have a conference table in my space we get those engineering drawings and we don't have a place to spread out on	**is a kind of**	**problem with horizontal worksurface layout**
flexibility of the way you can use your space	**is a kind of**	**perceived user control and choice over workspace**
[none elicited]	**is a kind of**	**perceived lack of user control and choice over workspace**
more work space needed staff office should be bigger a sense of spaciousness larger amount of floorspace good amount of floorspace couple of chairs with room to sit down	**is a kind of**	**floor space need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
bigger room so if wanted little meetings in your office you could	**is a kind of**	**floor space need (continued)**
room for visitors to discuss, [where] two people can sit comfortably		
phones and computers wired through modular furniture		
space for computer		
kind of like being in a closet	**is a kind of**	**lack of floor space**
lack of guest seating [not enough floor space]		
lack of guest seating--there's room right now for at least one guest chair		
lack of space--people coming in with requests--nowhere for them to sit down		
not enough space for several people to stand there [in individual office]		
can't conduct little meetings for all the people [I am] meeting with at one time		
too much furniture, we don't have the floorspace to put it in		
congested, inadequate space, unsuitable for type of work that's being done		
some cubicles don't have room enough		
the size area that we have to work in really is not adequate--for the fellow working behind me, for him to go in and out, I have to move my chair		
larger areas--I think that we are so cramped that a lot of the work that we should be able to do comfortably is either not accomplished or we complain about it [referring to individual workstation and group areas]		
there is no open space anywhere, there's no break from being packed in		
more meeting places [are needed], we are always joking about that we call meetings in the hallspace		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
CADAM scope in our group CADAM graphics workstation CADAM scopes right at particular table if that great a use or at least in that particular area all [workstations] have their own PCs, at a minimum with mainframe capability to get into aircraft status, log on daily basis and [access] mail phone convenient--things set up for for easy access--don't have to get up and go somewhere to do it [work] like to have everything almost within reach files are convenient to me my storage space, in my area, when I want it, it's here now being able to have reference material handy and not having to go looking around for it	**is a kind of**	**spatial adjacency need for equipment**
CADAM computers are remotely located, it would be ideal if they were located closer to our space, but this is a minor problem leaving work area to go somewhere else to do their work, I think tools should be right there, it's quite a distance to be walking back and forth don't have readily accessible reference material	**is a kind of**	**problem with spatial adjacency of f&e**
[none elicited]	**is a kind of**	**problem with equipment lack**
traffic has not been routed through my area [Stress area], adding to that privacy illusion not too much traffic I like being in this row--not a real high traffic area location [of office] on perimeter, able to achieve some acoustical privacy this way	**is a kind of**	**preferred cubicle location**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
not in the mainstream [cubicle], I will not be interrupted that much how space is laid out, certain design elements in a corner location, so can't just walk in without me noticing away from the mainstream, but I don't elude the telephone	**is a kind of**	**preferred cubicle location (continued) location**
more adjacency between people that work together location of people more adjacent to each other idealistically, get groups located together being [located] close to your director or boss being able to tell when the boss is in co-workers close enough to work together have close contact with people I work with important to have guys that work together located close together easy access to the Production floor, to the airplanes would prefer one bigger area [for group] to isolate the group, but not the individuals avoid little individual pockets, [have] group environments rather than individual environments have CADAM out in the [general] environment instead of a separate room avoid people having to leave their work area to do their work having people in the same area, [in] close proximity all of my guys there together avoid little individual pockets, [have] group environments rather than individual environments near the restrooms not far from watercooler	**is a kind of**	**spatial adjacency need for group location**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
not a bad walk to the buffeteria	is a kind of	spatial adjacency need for group location (continued)
manager's door more adjacent to me		
everyone is not with their groups	is a kind of	problem with spatial adjacency of group location
not everyone is together in their functional group		
jobs in workstation not having nothing to do with each other, if someone is here to see me about my work, hard to concentrate		
[your] people are located in different areas		
up till now everyone in Electronic System has been pretty much together except those in trailors due to lack of space		
we are fractured right now [due to location], we have a communication problem right now		
major problem has to do with people we work with--space problem --we've got people scattered all over the place and we should all be in one area--[there are] even some in trailors		
getting the people remotely located in the trailors--it might be important for a particular person to be a part of the review [but] you don't feel like calling them up to get them involved in their reviewing--since they're so far away you don't even think of it		
having things readily available at my fingers	is a kind of	work organization need
things that I have to have at my fingertips		
ease of using computer at the same time I'm doing stuff		
fairly handy to technical references in immediate group area and then in library		
files convenient to me		
work surface in front of me for phone and computer		
speaker phone so I can continue writing at the same time as I am looking at prints		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
not really organized not being able to get properly organized because of layout and storage area for reference material, worksurface not big enough, not suitable	**is a kind of**	**work organization problem**
good quality furniture have enough chairs comfortable chair chairs, they roll around, comfortable I like the chair, they were armchairs some background music music, but that can be distracting too own coffee pot good ventilation	**is a kind of**	**physical comfort need**
not enough electrical outlets outlets, plenty of electrical never enough electrical outlets lots of outlets	**is a kind of**	**need for additional electrical service**
capacity of electrical system is not enough can't plug too many things in	**is a kind of**	**need for additional electrical power**
some cubicles cold, some hot one place too cold, sweat other places within group of Systems Engineering, as much as 10 degrees temperature change usually just too hot [in workspace], never found it too cold temperature changes temperature control is a problem temperature control is poor [no] climate control	**is a kind of**	**HVAC problem**
access to some of the areas-- who may be near, but corridor not amenable to that nearness no halls going out one and down the other to get there [from one cubicle to the next]	**is a kind of**	**design problem with corridor layout**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
like walking through a maze maze effect maze effect creates some loss of time [so] checking work is not done enough confusing, it's a maze, it kind of wonders all over--the pathways through the areas themselves are scattered all over get away from the maze effect--you just don't know where people are it's like a rabbit warren, pathways are broken up no quick pass-throughs avoid traffic flow [by my workspace] if all the aisles dead-ended, then that would be better [not as distracting] difficult to find your way around avenues through office space one of the aisleway is very narrow -- passageway, two people can't walk side by side	**is a kind of**	**design problem with corridor layout (continued)**
doesn't appear that HVAC has been coordinated in its layout of cubicles needs to be more coordination between space planning of panels and computer people and phone and electrical avoid cabling from the ceiling furniture rearranged from original intent [in my cubicle]--bookcase on wall with fluorescent lamp [underneath bookcase being used as light source] intended to have a desk, but now has a drafting table at a higher level [task lighting is improper]	**is a kind of**	**design coordination/ planning problem**
directors do no communicate, they forgot us [my group] when they did the space planning	**is a kind of**	**management coordination/ planning problem**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
no control, allocation, where they're located [photocopiers]-- no real distribution for use of these machines [need some kind of organization of printers, xerox machines--streamline equipment--standardize the number of people using printers--loading of the printers with equitable distribution of users don't have online access to the Company's Computer--I just have a PC--I have to go way up front [and] schedule a time to input numbers, could do it at my cubicle [if online] don't have latest budget numbers when we go to adjust it [budget]--have to go to Corporate or guess when we turn in annuals [budget], they adjust it but don't tell us chaotic, various bosses with conflicting priorities everybody's got their own system of planning so it's hard to put it together--we define our effort, but then it has to mesh with what everyone is doing outside our group--the Company doesn't have a standard, none of it [planning] is coordinated we lack good person tools and computer tools --people that are trained in resource planning--to do this planning we know that there's a certain input we get from outside our group--the big hurdle [is knowing the number of people needed for a certain amount of time]	**is a kind of**	**management coordination/ planning problem (continued)**
ability to hang pictures on walls	**is a way to**	**personalize work space**
more exciting colors on partitions and not purple [as in another area]	**is a kind of**	**aesthethic preference**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
proper lighting, [task and general] adequate lighting	**is a kind of**	**lighting need**
good overhead lighting		
natural light [exterior window]		
natural lighting, floor to ceiling windows		
need outside lighting with natural lighting		
need scope shield over general lighting		
need table lamps to highlight what you're working on		
lighting under shelves is pretty good, but some require additional drafting lamps		
dark--lighting problem overhead	**is a kind of**	**lighting problem**
lack of exterior window [for] natural lighting		
low light good for scopes, but not good for things working on by CADAM		
poor lighting		
lighting that wasn't quite so harsh [due to lack of diffusers]		
glare on the screen		
general lighting not over workstation		
[exterior] window	**is a kind of**	**contact with outside world**
window to the outside		
to be able to see something nice, some landscape, tree, flowers --I know you can have that--so don't feel cut off to the outside		
chaotic, such as seventeenth move of workstation--nothing is permanent	**is part of**	**organizational change**
everything is temporary, whether it be your supervisor, location, or job scope--exciting because with all of this you're never bored		
the job is not temporary, but everything about the job is temporary		
exciting		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
for this particular group of engineers, I have moved four times in five years Avionics Electrical Engineers [department has moved] seven times to different buildings I've been here four weeks [in cubicle], moving to open area soon, may be in open area 1 1/2 to 2 years an adventure	**is part of**	**organizational change (continued)**
doing things wouldn't have to do if this were a place like Boeing--here you get to do a variety of things and are able to see the whole picture, and you will get involved at some point in those other areas	**is a part of**	**work routine**
there are no labels, no directions [for wayfinding] [with] break-up of the groups, you need directions	**is a kind of**	**problem with environmental graphics**

APPENDIX B

DOMAIN ANALYSIS
MANUFACTURING ENGINEERING

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
prepares time daily cards--can't be disrupted during 30 minutes allocated or I won't make my schedule paperwork logging in and out filling out of paperwork--time cards and time sheets fill out certain forms writing, filling out forms, reports at desk try to write all my manuscripts at drafting table [programming of parts] formalize changes of job at desk reading specifications and/or procedures at desk [provide] justification for buying of equipment [is] done at desk formalizing quote for outside work [is] done at desk [make] drawing changes, concept [is written] by hand before doing them on a CAD scope--largest ones are 12' maintaining proper data maintaining reports and schedules maintain or suggest adequate manpower needs to management reviews spares' orders from customers, etc.--they come in on a slip I collect data from the designer's themselves help supervisor with weekly report, have to do charts for his support lay out work plan for the day hands-on work: troubleshooting, evaluating, and correcting problems of assigned departments troubleshoot jobs down in Shop, proofing of parts talk to people directly	**is a kind of**	**job activity**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
public relations--always in the middle so-to-speak, talking to supervisors, having them sign for that particular problem	**is a kind of**	**job activity (continued)**
phone calls		
making phone calls		
make phone calls		
occasionally use phone		
talking on the phone occasionally, used a little		
talking to venders on the phone		
talking on the phone, including inside and outside vendors, but primarily inside [phone calls]		
talking on phone [communicating with originator of tool order], and handling liaison tasks with Tool Shop		
use phone to talk to people inside Plant about these orders [spares]		
use the phone a lot		
proper scheduling to proof jobs so know when we have to be there [this has been a problem]		
review blueprints		
reviewing our blueprints to see everything that needs to be done to that part--[to see] the different processes that the parts need to go through to be completed		
review drawings		
reading drawings on drafting table		
review engineering drawings [to] decipher and establish a plan of manufacturing--telling Shop how to meet that drawing requirement		
reviewing engineering drawings, drawings can get as big as 8'long, norm is about 4'long, width 36"-42" wide		
working on engineering blueprints--some of the blue prints are fairly lengthy, 10'long and 15 sheets		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
look at blueprints and plan order of operations to make the part that's on the print	**is a kind of**	**job activity (continued)**
looking at blueprints and design		
look over the engineering drawing, deciding how to make the part or initiating the change--tool requirements and orders, processing/ routings--[my job dicatates] the sequence of operations, telling Production Control how to make parts		
working on drafting table, drawing-- mostly laying out a map for a computer program		
CRT for programming		
programming a job		
plan the machine parts at terminal		
check in on computers to see if parts are being made		
work on computer PS--restricted to supervisor--can type memos, can add lines to screen; and phone mail will take phone messages, have to key in [but VP says people cannot put phone on phone mail system]		
work on computer PM [which is] more general--user can only read, basically		
work on TSO terminal mainframe, debugging, etc.		
using computer terminal		
utilizing computer mainframe and PS and PM system and PC		
working at computer mainframe, and PM, sometimes CADAM scope		
working on CAD scope		
[work on] CAD scope		
using CAD scope		
sometimes work at CAD scope		
work on CAD scope making drawings, [provide] instruction books for the Shop		
design on CAD scope some type of a fixture that would be used to hold that part		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
use CAD scope to come up with concepts and then toggle over to mainframe to notify people that design is ready for sign-off	**is a kind of**	**job activity (continued)**
using the computer most of the day--work off the engineering drawing		
working on plotter, and picking information up in other building		
pick up plots--walk physically to computer room in main building		
sometimes work at PC		
correcting route cards [making] physical change, using CRT to do this		
designing of tools		
tool design concepts--design fixtures to hold the parts on drafting table		
making tool design concepts		
communicate with originator of tool order--talking to them, [they] come to me or [I] go to them		
supervising [my people's] activities--constant conversations with them, general communication and private communication		
[evaluating] review times of my people, other private conversations [are] in supporting people that work for you, supplying [them with] information, receiving information [from them], helping them to accomplish their job		
writing for programming of part		
answering questions of my people and other people [in person]		
holding meetings		
proofing of job down in Shop, work [is] outside area [located in Shop] and trouble shooting of any job		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
also in Shop these jobs are pretty much in your command if have to go to office to say, make a change or whatever, everything needs to be at a high priority at a time--we can make a program, but then depend on someone else to make a paper tape--needs to be high priority to get done as quick as possible as we're holding up people in the Shop--we pretty much get everything quick, usually not a problem at all proofing program parts, downstairs in Machine Shop sometimes on Shop floor investigating machines or tooling problems	**is a kind of**	**job activity (continued)**
prefer l-shaped office design [diagram indicates preference for l-shaped office design] l-shaped arrangement [workstation] opening at right angles or desk as barrier all workstations to have cubicles, [they] could be grouped together like two people to them, [you] don't have to have individual prefer the cubicles so don't have as much outside people running through their aisles [respondent's group] if [we] had a doorway with a partition, close [my section] off as one big area [with] hallway maybe one window providing it's in it [partition], but I don't like to be in front of the window window [in partition] with blinds it was open office when I worked elsewhere [respondent liked this] partitions rambling [with] very few straight lines in the office [curved partitions with doorway openings staggered], desks all faced in the same direction [environment at former employment]	**is a kind of**	**preferred workspace layout**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
[general office area would not have] stairs to the Shop--I just don't see the point, I think they [general office area and Machine Shop] should all be on one level	is a kind of	preferred workspace layout (continued)
drafting table right behind my desk for looking at drawings		
have more room--the guy beside me is on a different shift, so he doesn't cut in behind me [while respondent works]		
would like to be able to see my people	is a kind of	supervision need
doors are something for managers [respondent was not a manager]		
anyone can walk through the door --stops [me] from doing the time cards	is a kind of	supervision problem
don't want window in a partition--I think it creates a negative respect for them, I just don't think it's necessary		
floor-to-ceiling partitions, but not [with a] window right onto my people if it would give the impression of checking up on them, then no, I would not want that		
[when] one on one, none--but [with] more than one, size [lack of space: office conditions making it harder to supervise]		
lack of privacy--during the more recent review periods, I set up schedules with a supervisor [in his office--his office has floor-to-ceiling partitions with a door]		
in the ideal [general office area], have an 8'table to confer around, [this] would be adequate		
being able to put it in the tray or somewhere [when completed]	is a kind of	storage need
adequate shelving or cabinets for reference materials--requirement specifications, job fabrication procedures		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
not much shelf space	**is a kind of**	**storage problem**
cabinet to put personal items in, lockable lockable file file cabinets secured for brochures, quotes, or equipment [is important] at all times--information is not classified, but everybody doesn't need to know it lock-secure overall group areas desk with lockable drawers my drawers lock [respondent likes this] desk that locks storage of personal items a lot of guys don't have lockable desks and have had change stolen, it's like invading your personal space good organization--shelves, cabinets, drawers--prefer something I could lock things up [in] lockable bookcase and be able to secure desk bookshelf space for books, lockable adequate shelving or cabinets for records, etc., at least one cabinet lockable	**is a kind of**	**storage security need**
a lot of guys don't have lockable desks and have [I] had change stolen-- it's like your own personal space-- it's basically yours there, you don't own it, but [you] don't want anybody messing with it my personal area is really not secure, there's been theft personal inspection tools--but if they're going to get stolen I'm not going to keep them there [in personal work area] filing area, preferably lockable, closed filing cabinet--I've had instances where people have let me know that they have been through things on my desk	**is a kind of**	**storage security problem**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
limited disturbances for [from] people walking by and coming to see me quiet no disturbances not too many disturbances sometimes I'd prefer to be in my own little area where I can't be disturbed quiet no disturbances--a lot of concentration goes in that [program writing] more private, and quieter--we have a big problem with outbursts of the conversations and the laughter-- there are some mornings that we are having conversations with people 40' away quiet enough that you can hear quiet area quietness quiet surroundings it would help if it were quieter, so that you could hear over the telephone quieter phones phone conversations should not go across the room in secluded area, to reduce noise level [while working on CAD scope] no distractions less distractions very little interruption noise level [low] assists in not breaking concentration--[but] people come up and talk to me at my desk processing of machine parts can be quite lenthy at times, it involves a lot of concentration a place [personal work area] that could be used in private when necessary a little bit of privacy semiprivate	**is a kind of**	**privacy need**
[none elicited]	**is a kind of**	**nonprivacy need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
lack of privacy	**is a kind of**	**privacy problem**
lack of privacy--it's not uncomfortable working next to peers, but when anybody near you has a conversation, if you want to, you can listen in		
lack of privacy--more people get involved than have to get involved [when talking on the phone with originator of tool order]--sometimes that's helpful, but more times than not it's distracting		
not private enough at times [personal work area]		
limited on room--don't have any privacy		
no privacy--people walking by, they distract you--you know the sound of their footsteps--then talking, and just generally being able to see [them] while you're trying to work		
lack of privacy--talking--a lot of times you get involved with people talking at another work station		
lack of privacy that is needed at times [personal work area]		
if [you] overhear conversations, can't concentrate on what you're doing		
personal conversations		
can overhear conversations		
overhear conversations		
overhearing conversations		
lack of partitions makes it a little harder to hear sometimes and we work at very close tolerances--if there's a lot of mumbo-jumbo going around, I think it can lead to you making a mistake--we work with parts that are very very costly, some are easily $20,000 a part--like wing ribs, [and] crane beams		
it's inconvenient [conversations can be overheard]		
I don't mind someone near each other talking, but it's the distance [long distance conversations across the general office area]		
somebody in the area talking		
everybody stops to talk to me		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
talking loud or laughing or if someone gets their butt chewed out of course everyone's going to watch	**is a kind of**	**privacy problem (continued)**
conversation [is] disturbing, like when talking on the phone		
overhear other conversations		
personal conversations located right near coffee machine		
people stop right at my desk and talk to each other right at my desk--copier is right there [people are using copier]		
my office not private--no door and walls [do not have enough sound insulation]		
doorway, but [no] shut door, no way to shut anybody out		
don't like my back to everybody		
accessible to anyone, don't have a door to stop you		
noise		
noise problem		
noise-- conversations, phone calls, noise from the Shop through air vents open to the Shop, traffic on main hallway		
too much noise, [but] usually [this is] not a problem		
the noise level sometimes gets bad		
it's very noisy		
sort of noisy		
[I] work with a good group of people, but it does tend to be noisy		
verbal and printer noise		
pretty noisy by conference room sometimes when a lot of people sitting in there [respondent is by conference room]		
noise level in general, all [of it is] man-made--no problem from Machine Shop		
hard floors [because of the noise]		
printer in office to the left of me that's extremely noisy		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
machines that go tick-tock, tick [like] copier [I] wouldn't have machinery sitting out in open, to help keep down the noise from it	**is a kind of**	**privacy problem (continued)**
phone ringing phone rings [and] stops person [working] at another desk telephone phone ringing--our phone has an amazing bell ringing--some other areas don't have this annoying [bell-like ringing] better phones that weren't so annoying--sometimes it sounds like a telethon noisy phones [surrounding phones in general office area]		
don't like these speakers, where they're located, when it goes off it would sound like someone was right here paging somebody page off and on and music off and on--I guess paging system is turned on to these particular speakers		
noise level and acoustical distractions-- [I] almost made a mistake, I found a $30,000 mistake one time, I'd like to think it's due to distractions and not my own incompetance distractions from groups that tend to collect in the area [general office area] lack of separation from other departments--by that I mean some physical barrier--distraction by noise and we create the same distraction the other way as well probably the two most distracting things around here: "I don't like to have people across the wall, speaking--and the noise, and [from] the printer in someone's office [printer is located next to respondent's office]		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
people walking by is distracting--being in an open area, it's too easy to get involved, to turn around and be distracted by other activities going on around you	**is a kind of**	**privacy problem (continued)**
coffee pot should be away from work areas, people hang around a lot and it causes a distraction		
I'm distracted by co-workers and other people walking down the hall		
distracting--here I am on the main hallway--we have a hard tile floor, it's impossible to miss someone when they're walking		
distractions around me		
distractions		
If carrying on a conversation on the phone, if [I] get distracted [this makes it harder to talk on the phone]		
[I am] easily distracted there 'cause it's [personal work area] centrally located, has a well-traveled hallway		
[interior] windows don't help--sometimes if we hear a loud noise we look out of it--maybe that's a distraction then		
people walking by--that distracts you		
quite distracting for what I do [type of work]--noise I was talking about		
I'm by an aisle trying to concentrate --it's very distracting		
distractions in the area		
distractions--activities that you can either see or hear		
disruptions		
walk-in disturbances		
disturbances [from] walk-ins		
matter of disturbances--phone calls and walk-ins		
a lot of disturbance		
sometimes what goes on in other areas is disturbing		
any kind of disturbances [conversations]		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
interruptions interruptions, I guess interruptions of an open area--conversations you can hear and see what's going on everywhere--[this] interrupts your work, some people it annoys more than others--through office windows [you] can see people being disciplined, we want to know who's getting it pretty crowded too open sometimes too much communication [you] get a lot of unsolicited input in open area you're in--things you really don't want too many opinions--if I lay out a drawing, there's always people stopping by to see what's going on and [say] what they think about it uncarpeted floor--that contributes to the sound of the people walking by	**is a kind of**	**privacy problem (continued)**
cubicles for everybody would cut down on the socializing and get us more work-oriented, probably partitions, when you wanted to talk to somebody you could, but when you did need some privacy to think things out, you could cubicles or partitions would help a lot, because we could hear over the phone better [my office with partitions is] quieter than outside my office would want something, maybe a wall in front of my desk--something to help me in my concentration, to keep down the distractions--they also come in handy for putting up blueprints, the largest drawings we would have would be about 6'long it's nice that there's room in front of me, so if I need to concentrate on something, there's nothing in front of me to distract me	**is a way to regulate**	**privacy through environmental mechanisms**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
[having a large table where respondent can spread out drawings] is important 90% of the time--planning being my basic job function--I think [personal work area] should be spacious enough where you have room for everything--if I have to stop and page through the drawing, it breaks my concentration and doesn't do much for the man beside me	**is a way to regulate**	**privacy through environmental mechanisms (continued)**
too open--it would be better if we had cubicles, we could concentrate more--wouldn't be as disturbed by the people walking by		
everybody likes to have an area that's theirs, a kind of home away from home to figure things out		
[cubicle] privacy--enough to cut me off from the noise		
individual cubicles, but large enough to hang drawings		
private cubicle		
cubicle, also another advantage to that [having cubicle] is the wall space to put drawings on		
[in the ideal general office area] each individual to have his own private cubicle and this be separated in some manner by any other departments		
cubicle, two people at most, everyone to be in cubicles		
for the general traffic to be routed so as not to disturb everybody		
office-like [ideal personal work area], would have a cubicle, desk-like work area to spread out drawings 4'-12' long--I mostly deal with 12'long [drawings], just as long as it's quiet		
enclosed cubicles would be more private [ideal general office area]		
cubicles, less than 80", no window, no door		
partitions at 5'[high]--if you could stand up and see, or a higher wall with a window to see out of		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
partitions about 5' high because I could see over the top to see if someone was there or not [environment at former employment]	**is a way to regulate**	**privacy through environmental mechanisms (continued)**
cubicle layout [62" H that I] could stand up and see over them		
either kind [62" H or 80"H], the kind you could look over or the latter		
entrance to cubicle walls about 5', to be able to look over and see when someone is there		
5' high [cubicle]--you could sit down and not see anybody walk by, also, you could stand up if you're looking for somebody in particular you could see them		
conference room height partitions [80" H]		
AC [ceiling] panels have helped a little with the noise		
some sort of noise-deadening dividers--there's no doubt about it, planning these parts is a complicated process, people's lives depend on how [well] we do this job		
ceiling staggered [environment at former employment], evidently they had something in mind, it helped deaden the noise		
liked the white noise [environment at former employment]--it was interesting how it was able to keep the noise transference from other parts of the office-- we had 600-700 people in our office with open partitions, but when you stepped inside it you couldn't hear a single word		
it [ideal personal work area and general office area] wouldn't have a musaic system--it's distracting for me--first thing you know I'm listening to this song and then [I] can't get it out of my head		
closed door, put phone on phone mail		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
carpeting carpeted floor for one thing, carpeted to cut down on the noise level	**is a way to regulate**	**privacy through environmental mechanisms (continued)**
open door policy, anyone can come in when they want to--[they] don't have to go through chain of command [as a supervisor] being of a nature that [I] can be interrupted when things are being prepared--the nature of the work has to allow this use backup person if I am talking to someone to answer phone and phone mail or fill out time cards also [backup person] will be used to screen those people that want to see me	**is a way to regulate**	**privacy through social mechanisms**
with confidential conversations, [I] try to set up a meeting directly, say with supervisor, so people won't overhear [have meeting in supervisor's office] [don't have] that door that's closed [so] no interruptions--[I] try to find a place like a conference room [during private communication] [I] find that if I have an awful lot to do that requires a lot of thinking, I have to shut my mind	**is a way to regulate**	**privacy through behavioral mechanisms**
[none elicited]	**is a way to**	**increase environmental load**
I think the open areas develop social contact easier--everybody's there--if you need something from somebody you can see everybody	**is a way to**	**encourage communication**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
advantage to an open area, if I want to consult with somebody, I can see if they're there [respondent likes this, but dislikes interruptions of an open area]	**is a way to**	**encourage communication (continued)**
[none elicited]	**is a kind of**	**problem with partition height**
it was [is] a cave, it's just a big hall, it echoes [avoid] open conference room concept [general office area] openness openness of it [it's] very open openness of it--sometimes I think I'd like more privacy	**is a kind of**	**problem with lack of partitions**
[none elicited]	**is a kind of**	**problem with partition windows**
everybody should be treated the same--[they] should have the same work features chair for a visitor low chair so we can scoot up to table and enter [data] into computer telephone telephone--the people that have the problems usually contact me by telephone have my own telephone telephone for calling the Shop and everything or other engineers have my own terminal connected to mainframe computer assigned to me--every change I make, I have to put everything in the computer	**is a kind of**	**preferred f&e in personal work area**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
computer terminal [in respondent's ideal personal work area]	**is a kind of**	**preferred f&e in personal work area (continued)**
terminal [in respondent's ideal personal work area]		
CRT [in respondent's ideal personal work area]		
having my CRT available		
CRT-- that's where I find most of the information: when and why		
always have a CRT, the guy beside me is on a different shift		
my CRT is almost always available, the guy next to me [who also uses CRT] is on the third shift		
PC--beginning to think--[for] report writing, time and tooling costs, pull reports and different information		
CADAM scope		
pretty much have everything I need--[with] CAD scope, don't have to share plus [can use] terminal for programming-- it's real convenient there		
drafting table [in respondent's ideal personal work area]		
where we have a proper place to put it out, like a table and so forth [makes it easier to review drawings]		
drafting table to lay drawings out on [in respondent's ideal personal work area]		
table for computer terminal by itself		
table for computer to sit on, it gives more room at our desk[s]		
separate table off by itself [for CAD scope]		
separate table for computer to sit on when entering in manuscript or your program-- got a place to put your notes or drawing just laying to side and can refer to it without having to get up and move		
[computer terminal] on a separate table		
computer terminal [in respondent's ideal personal work area]		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
having proper support data [catalogues, engineering prints] [I] wouldn't have outside magazines [I] wouldn't have regular desks, but built-in like--I think you get more room to move around and stuff and be more comfortable [have] modular furniture setup to certain extent--when sitting down couldn't see person but [when] standing up can see person on the other side modern furniture carpets [carpeting] on the floor	**is a kind of**	**preferred f&e in personal work area (continued)**
slight problem, [I] don't have any modular type furniture furniture layout [with back to everybody] a lot of space underneath where I can move around where I won't hit things underneath [as I do now] as I slide over [to where computer is located], I hit the desk and scratch my shoes--the leg of that table where computer is, we tend to put our foot on--the paint has rubbed off [because of it] we're sort of outdated furniture-wise in comparison to other parts of the Plant	**is a kind of**	**f&e problem in personal work area**
use panel wall and use push-in's enough area to get the job done use panel wall to hang things on enough room to hang up a drawing, [I'd] rather have it hanging--just somewhere close, as it's hanging [I] can refer to it--than on a table	**is a kind of**	**vertical worksurface need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
table where we could lay the prints out, need to be able to leave out, sometimes for a period of days but don't need to lock surface up	**is a kind of**	**horizontal worksurface need**
large table for reviewing drawings, 8' would be sufficient size		
within our group, a section that we could use for a bigger project to spread drawings out on--some drawings need to remain out for up to two weeks but don't need to be [in] a secured area		
enough space to spread out where I can see the whole picture [drawings]--notes, instructions [that are] in different locations--I want to be able to see all of it at the same time--I want to be able to put it [drawings] somewhere I can see it easily, [a] place to hang my drawings up to look at them		
a large enough area to spread my work out--sometimes would need to leave spread out--hanging up or whatever it may be		
an area to lay the blueprints out so you can read them better		
large work area--desk and drawing board		
work table when I have to study a blueprint, which is quite often, not all the time, but quite often		
be able to spread out designs from time to time		
work surface to spread the drawing out, 34"x134" long		
a lot of space to lay drawings to write on, to label		
surface to lay things		
more work space		
large drafting table		
drafting table [for reading drawings, reading line tool drawings, and sketching tool concepts]		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
another table where I can spread out drawings and blueprints--I don't think a workspace should be cramped two desks [drafting table and 30"x60" standard desk]--usually just lay drawings on it [drafting table] and writing manuscripts as well at the present time under today's situation, not a problem because they have let so many people go, we have plenty of desks to lay drawings on plenty of table space, [I] am constantly involved in [several jobs] at one time	**is a kind of**	**horizontal worksurface need (continued)**
not enough room to hang up blueprints and stuff--that area always seems to be cluttered not enough room, no place to hang drawings	**is a kind of**	**problem with vertical worksurface layout**
drawings could equal eight to nine feet [no place to lay out drawings] lack of work surface not having the space for it [reading drawings on drafting table] no place to spread drawings out --I've seen some guys lay them out in the aisle, 20-30'long not being able to spread it [drawings] out ability to spread out drawings, larger surface to work with the way it is now, I have to spread the drawing out on my desk and it covers everything--it's nice to be able to see everything, that's why I spread it out lack of space to open the drawings up fully	**is a kind of**	**problem with horizontal worksurface layout**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
small work area [makes it harder for respondent to review blueprints] [it's] difficult not having a large enough table [to look over drawings] wish we had a desk and a drawing board [it would be] nice if we had more tables to put blueprints out on	**is a kind of**	**problem with horizontal worksurface layout (continued)**
[none elicited]	**is a kind of**	**perceived user control and choice over workspace**
it seems to me they want me to do a professional job, but the Company doesn't want to give me a professional environment in which to work unprofessional working atmosphere-- in this area [it] tends to be more unprofessional and lax--I believe that an engineer or professional is only as professional as he feels in his surroundings--it's not the office layout that you would think you would see in a manufacturing engineering office that would build a 20 million dollar airplane--I think that the attitudes are spurred by the area	**is a kind of**	**perceived lack of user control and choice over workspace**
set up seems to give us a little more space we use a lot of drawings--furniture doesn't really restrict us too much-- some drawings can be as long as 20 feet long enough table space around desk area [I] feel like I have enough room [in personal work area] plenty of space [in general office area]	**is a kind of**	**floor space need**
everything is all jambed together small, cramped [personal work area]-- I usually have to stand up for somebody to walk behind me	**is a kind of**	**lack of floor space**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
cramped area we get along real well together, considering we're all jambed in one room [it's] probably too hard to get to your area--we do have to get together on some projects some of them [general office areas], even with cubicles, I find are very cramped for space--some of them are not, some are	**is a kind of**	**lack of floor space (continued)**
floor set-up is real convenient [everything readily accessable] never have to get out of my chair to do anything in my office enjoy having cad scope right next to me that I work with everyday to have my own scope and other machines that I need without having to go to another area to complete my job [have to go to main building now to use the plotter]--if [I] had one in our area [it] would probably save time easy access to scope close proximity of these scopes to our desk is helpful easy access to tools needed to do the job--CADAM scope, office supply, printer ribbons--things like that everything accessible three scopes for four designers, if all are being used then I would have to go elsewhere CAD scope is the main thing easy access to the CAD scopes, rather than in a central location I use it everyday, [I] toggle back and forth with the PC--[In addition to designing tools the PC] gives me access to engineering blueprints; and [I] can have access to phone messages--it would help me in case there's a question from Tool Shop or when some other designer asked for assistance; sometimes people call about the parts we order, helps me out then, too	**is a kind of**	**spatial adjacency need for equipment**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
close to coffee pot	**is a kind of**	**spatial adjacency need for equipment (continued)**
place to put something while working at scope, reference material or something else--I forget how to do that but I'll do it this way because the reference material is someplace else, instead of trying to do it right		
occasionally a writing surface [for] book-type drawings--instruction books--[located by CAD scope]		
we use TSO mainframe to access plotter, so availability of the plotter [located in main building]		
proximity of it [computer]-- [it's] in the office with me on the other table		
work surface by CRT to lay spares' orders on while typing at CRT		
phone to be located close to you		
brochures I refer to when talking on the phone [while working at my desk]		
two extensions in our area, so it's fairly easy to talk on the phone		
[general office surroundings should have a] central location to keep literature specs, and CAD scopes, and an accessable PC		
plotters for CADAM scopes would cut down a lot of walk-time to main plotter room [located in main building]--tool designer does more CADAM work than anybody in this building		
mainframe assigned to me right at my desk		
don't like set up when crt's next to our desk	**is a kind of**	**problem with spatial adjacency of f&e**
avoid too many coffee machines-- [I] don't want them to be where they can interfere with other people--people tend to stand around and socialize--[this] can be distracting even with cubicles		

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
[would like] a CAD scope closer to work area [that's] multipurpose for CAD, PC, and mainframe connection rather than three different computers lack of table space nearby [makes it harder to work on CAD scope] no place to put reference manuals, reference drawings, or whatever [while working on CAD scope] also, plotter located with CADAM scopes [located in main building], heavy use of that plotter	**is a kind of**	**problem with spatial adjacency of f&e (continued)**
everybody congregated using CAD scope, [we have] three [scopes] in our group for entire area to use only have three of them [CAD scopes] and they're in use a lot--[I] have to go to another building to use plotter after using scope--don't have one here sometimes CAD, which is shared, is being used by others access--CRT's are shared--even though it's set up as one for any two people, if one's available some guys will go to it--bad part is that it's not being used all the time--you may not use it for days and then you'll both [need to] use it four people on one line--that would be the only hindrance--that it would be in use	**is a kind of**	**problem with equipment lack**
enclosed area away from main traffic [I can] see what's going on around me in that big open room open space not restricted not to be located on main aisle it would not have a coffee machine nearby	**is a kind of**	**preferred cubicle location**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
I like it [general office area] because it's away from management--directors, managers, stuff like that --[creates] relaxed atmosphere	**is a kind of**	**preferred cubicle location (continued)**
fact that we're laid out in groups (not intertwined) our group is together have my people close together a place [personal work area] that is adjacent to people I work with we need to be close to engineering, to discuss problems with them directly, have to walk around to a completely different building--his time over there is considered more valuable, paid more--we make less, so cheaper for us to walk over there work close with group--we're right near each other CAD scopes are here in programming, if I need any help or assistance, one of the programmers can help you like it where you could be able to contact other employees within my group in that area and not be so isolated, [I] don't want supervisor looking at me either easy access to area that we are responsible for [in Machine Shop] any time I have a problem on the Shop [Machine Shop] floor--it's important to be able to respond to the Shop's problems in a timely manner at all times--that's how the Shop communicates with you easy access to people we deal with daily it's [personal work area] practical--[it's] convenient to the Shop, buffeteria, [and] centrally located it's [more general office area] conveniently located--close to secretary, close to Shop, [and] buffeteria	**is a kind of**	**spatial adjacency need for group location**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
close enough together that we can communicate with each other, we don't necessarily need an absence of walls to do that accessibility to the people [in] my group geographic location of our area [tool design group] being close to the tools we design is helpful being able to deal with other engineers who deal with the Shop--the geographic location of us [tool design group] as compared to other groups it's handy to see somebody in these groups right here	**is a kind of**	**spatial adjacency need for group location (continued)**
[none elicited]	**is a kind of**	**problem with spatial adjacency of group location**
try to keep it fairly neat wouldn't want things to clutter it up [in ideal personal work area] clean, neat look they keep it clean here I think they give us the supplies we need to work with and so forth	**is a kind of**	**work organization need**
we have that problem,too--not enough space to put things, everything is just piled up all the time crowdedness--plots on the floor	**is a kind of**	**work organization problem**
being comfortable when I'm working being comfortable during that time --[I] may be typing for hours chair [comfortable]--during all aspects of my job entering program into the computer good chairs--you know--nice back support, good, comfortable chair good comfortable chair since [I] work at computer a lot good comfortable chairs when you're at drafting table, when you're at computer terminal, [and] just for the general sake of sitting down--like for lunch or whatever	**is a kind of**	**physical comfort need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
[good comfortable chair is important] all day--work at computer more than most others, some areas [others] get out on the floor more it's [personal work area] comfortable furniture is comfortable [I prefer a] work area that has a comfortable temperature setting good AC--if too hot in here I get tired fast, and [with] cold temperature [same thing happens] comfortable working conditions--good AC [I] like the airconditioning and heat--the vents are better since they improved it Ac the way we've got it now	**is a kind of**	**physical comfort need (continued)**
[none elicited]	**is a kind of**	**need for additional electrical service**
[none elicited]	**is a kind of**	**need for additional electrical power**
Ac doesn't seem to work properly in our area AC problems--since [they] worked on the new ceiling, a vent is directly above my terminal, and blowing in my face--I hate that AC, but not as big a problem as it was lack of climate control--it's super hot sometimes, it's super cool sometimes climate problem sometimes it's hot and sometimes it's cold [HVAC] not really balanced climate controlled, still a problem	**is a kind of**	**HVAC problem**
also copy machine near them--if somebody has a problem they go to workstations near copy machine [people located on corridor, adjacent to copy machine]	**is a kind of**	**design problem with corridor layout**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
walk-by traffic because it's a main aisle [visual and acoustical] --if [you] were in a modular area, that wouldn't disturb you from your job distractions of noise of people walking by cut down on foot traffic and number of people people walking through [to see respondent and/or others] aisle is a main aisle, [and] is disturbing for individual sitting adjacent to main aisle respondent's office] open to everyone [walking down aisle] location by coffee pot, a lot of traffic back and forth since I'm close to aisle a lot of traffic in that area amount of traffic in the area don't like putting people together like this--[I] would like an additional hallway in terms of the cubicles I've seen [arrangements at Gulfstream], I'd rather not have it traffic area in front of my desk [makes it harder for respondent to work at terminal] also [I'm] exposed to traffic that walks through [personal work area] not to have a lot of traffic coming by an open side don't have high flow of traffic coming through [personal work area] either traffic going by my desk--I'm right on the main aisle there people cutting through behind you [at respondent's desk] the fact that aisleway runs right in front of us, people going to restrooms [located around corner] and to the copier a lot of traffic flow	**is a kind of**	**design problem with corridor layout (continued)**
original outlets not based on my preferences--I wasn't conferred with on how furniture and equipment to be layed out-- they [outlets] were already there	**is a kind of**	**design coordination/ planning problem**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
location of speakers is bad-- I think they could have strategically located them in better places problem with some of the duct work, falling over someone's desk where it's [computer] located, it scratches up shoes dirty floor--we have so-called maintenance crew, who clean up only the areas that you can see-- a lot of times we get wax on the floor jacks [exposed floor jacks] traffic to boss and group leader in relationship to my desk [hinders respondent when working at terminal] too much glare on screen--not that major a problem--location of the fixture [lighting] in relation to [workstation] people step off the ramp and [it] causes the digitizer to malfunction, the digitizer is attached to the drafting table--when the digitizer malfunctions, person using it has to start over what they're doing	**is a kind of**	**design coordination/ planning problem (continued)**
people have it [phone mail], but VP says we can't put phone mail on, because VP was calling and [VP] knew people were at [their] desk who didn't want to answer their phone phone mail system--when I call, I need to find out something, get a recording [telling respondent to leave a message]--but that guy could [really] be on vacation--when I have to have answers now, it's an emergency situation	**is a kind of**	**management coordinatio planning problem**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
scheduling--some way of knowing when you're coming up so you could plan around it a lot of old blueprints are not up to latest revisions getting improper data from designer or having area where machines are [to] malfunction, or [machines] being used by somebody computer response time is way down--that's the big bug right now computer breaks down quite a bit slow response mainframe [makes it harder to proof program parts] machine failure, which happens regularly, [in] Machine Shop area [makes it harder to proof program parts]	**is a kind of**	**management coordination/ planning problem (continued)**
[none elicited]	**is a way to**	**personalize work space**
[provide] pleasant look clean working environment [physically]	**is a kind of**	**aesthetic preference**
I like the lighting--used to have drop lighting, causing screen glare on CRT's most of us have a a cover [for] our terminal to keep glare out good lighting good lighting (for computer work and desk work) [personal work area is] well lit well lit, mostly taken care of [I] like the lighting, it's better than it used to be people around me prefer it darker around me than I do--[they say that] if you put a light bulb in, then I'm going to take it out	**is a kind of**	**lighting need**

INCLUDED TERM	SEMANTIC RELATIONSHIP	COVER TERM
lighting, [when] using drafting table, table light [makes it easier to write manuscripts for programming of parts] -- using overhead light is not quite enough	**is a kind of**	**lighting need (continued)**
[none elicted]	**is a kind of**	**lighting problem**
almost like you're in a hole-- [you're] too shut in--[I'd] rather have some windows to outside to have some connection to the outside [interior]	**is a kind of**	**contact with outside world**
has a lot of people have to deal with a lot of people exciting at times working on corporate aircraft	**is part of**	**organizational change**
kind of hectic sometimes complicated--you have to know [which] part goes on which aircraft	**is part of**	**work routine**
[none elicited]	**is a kind of**	**problem with environmental graphics**

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ENVIRONMENTAL DESIGNER

EXPERIENCE

The Savannah College of Art and Design
Program of Building Arts • Savannah, Georgia • 1989 - Present
Faculty member for architectural and interior design courses. Special emphasis on Environment and Behavior Studies. Research and consulting activities include Gulfstream Aerospace Corporation: Provided design recommendations to resolve acoustical and visual distractions affecting worker performance in two open-plan offices (housing over 200 engineers). Prioritized design features considered important to workers for user satisfaction and identified which design features workers perceive as regulating privacy in their work environments.

Environmental Design Consultant / UC - San Diego
Consultant services as an architectural programmer/UCSD Extension
San Diego, California • 1988 - 1989
Independent consultant work and part-time faculty member at UCSD Extension. Involved in Environmental Design curriculum development for Extension. Qualified as a GS-11 Research Psychologist by the Department of Navy, Personnel Research and Development Center, during this time period.

Virginia Polytechnic Institute & State University
College of Architecture, Environmental Design & Planning
Ph.D. Program • Blacksburg, Virginia • 1985 - 1990
Ph.D. Candidate. Doctoral Research: Privacy management in work environments. Part-time teaching, research activities, and design consulting.

King Faisal University
College of Architecture • Dammam, Saudi Arabia • 1982 - 1985
One of two Western Founding Faculty members for the first interior design department (females) allowed in Saudi. This had been previously forbidden by the Government. Primary Goal: Incorporate Western technology into MidEastern culture through curriculum development. Involved in design consulting and field research into Arab customs regarding social norms of space utilization. This includes an acute awareness of gender behavior patterns within business, social, and private settings; and an understanding of MidEastern logic and concepts. **World Travels** include: Japan, Hong Kong, Kenya, Thailand, Egypt, Austria, Germany, Italy, France, England, Holland, and Saudi Arabia.

Appalachian State University
College of Fine & Applied Arts • Boone, North Carolina • 1980 - 1982
Faculty member for commercial and residential design courses. Primary goal: Incorporate current professional practice techniques into design curriculum. Responsible for *seven different* design courses each year. Involved in reorganization of curriculum, student counseling, research activities, and design consulting.

Daytona Beach Community College

Facilities Planning Department • Daytona Beach Florida • 1977 - 1979
Administrative Specialist II (8/77-12/78) promoted to Assistant Educational Facilities Planner (1/79-12/79). Administrative and technical responsibilities involved the coordination of design and construction of facilities on campus. Responsible for development of all building programs with faculty and staff; review of construction plans and specs.; interior space planning and selection of f&e; writing bid specs.; and served as liaison representative to multiple city and state government agencies for the college. Over 17.5 million USD of construction in progress during this time (1977 appraised valuation).

EDUCATION

Ph.D. in Environmental Design and Planning (GPA 3.84). College of Architecture, Virginia Polytechnic Institute and State University - December 1990. Doctoral training in anthropology and environmental psychology, anthropological interview and survey techniques, qualitative and quantitative methods.

Master of Science in Interior Design with Minor in Urban Regional Planning (GPA 3.8). Department of Interior Design, College of Visual Arts. Florida State University - August 1977.

Bachelor of Arts cum laude in Interior Design (GPA 3.6). Department of Interior Design (FIDER accredited program), College of Visual Arts. Florida State University - March 1976.

RESEARCH

"How the Partially Disabled Senior Citizen copes with Design Barriers: An Ethnography," Unpublished manuscript, 1987.

Dissertation "Architectural Correlates of Privacy: The Dynamics of Privacy Regulation," December 1990.

"Privacy Regulation within the Overall Context of Culture and Environmental Relations," to be submitted for journal review, Spring 1991.

"Conceptual Framework of Privacy: Towards a Holistic Model of Privacy Regulation," to be submitted for journal review, Spring 1991.

"Empirical Measurements of Privacy: Current Practice, Limits, and Directed-Means for Improving Them," to be submitted for journal review, Spring 1991.

HONORS & AWARDS

Phi Kappa Phi Honor Society, 1987.
Selected to attend International/Intercultural Center for Built Environment in Santa Fe, New Mexico, July-August, 1986.
Graduate Teaching and Research Assistantships, College of Architecture, VPI, 1985-1988.
Outstanding Young Women of America Award, 1978 and 1979.

PROFESSIONAL MEMBERSHIP

International Facilities Management Association
Environmental Design Research Association