Understanding Information Seeking Behaviors and User Experience: How to Apply Research Methodologies to Information Technology Management and New Product Design

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Outline of Presentation

I. Understanding Information Seeking Behaviors of Professional Workers and User Experience in Technology

II. Information Seeking Behaviors of Engineer

III. Information Seeking Behaviors of Information Systems/Technology Workers

IV. Understanding User Experience

1.1 Central Role of Information in Technological Work

- The essence of technological work is knowledge and information
- Understanding how technological workers acquire and share information and knowledge is hence central to the management of technology

1.1 Central Role of Information in Technological Work

- Good ideas typically emerge from discussions and interpersonal interactions
- Productive and high performance technical professionals have extensive interpersonal contacts
- The human social network is the most powerful knowledge base!
- The internal communication network within an organization reveals not just the flow of the information, but also the informal structure of the organization (i.e., how things actually get done in an organization.)
- The external communication network reveals how well an organization keeps up with outside developments and new technologies.

1.1 Central Role of Information in Technological Work

Information flow is measurable through surveys and communication logs.

Measurements can be verified through physical records and social metrics (e.g., if Person A reported speaking to Person B, we can check if Person B reported the same interaction.)

1.2 Importance of Understanding User Experience in Product Design and Implementation

- Understanding how users use a product is central to product acceptance.
- Understanding user experience can provide a most important source of new products ideas.
- Understanding user needs and experience are key to both product design (i.e. product esthetics) and providing the functional specifications (i.e., product features.)
- Understanding user experience is central to effective implementation.

1.2 Importance of Understanding User Experience in Product Design and Implementation

Characteristics of an excellent product:

- Users might be passionately in love with a product or become “addicted” to it (e.g., a successful computer game).
- Users might like a product very much but unable to provide the specific reasons (e.g., driving a Lexus, having a good shopping experience, or enjoying a piece of music.)

1.2 Importance of Understanding User Experience in Product Design and Implementation

- But users may not always be able to articulate what they want from a product, or they may only be able to provide selective input without the complete picture.
- Hence, a systematic methodology is needed to evaluate user experience.

2. Information Seeking Behaviors of Engineer

- Unlike science, technological knowledge is very difficult to encode in a written format. Instead, technological knowledge is captured by physical products, or process, and in people's minds.
- It is infeasible to document all information about a technological system.
- Engineers rely primarily on interpersonal communication as the primary mode of knowledge exchange.

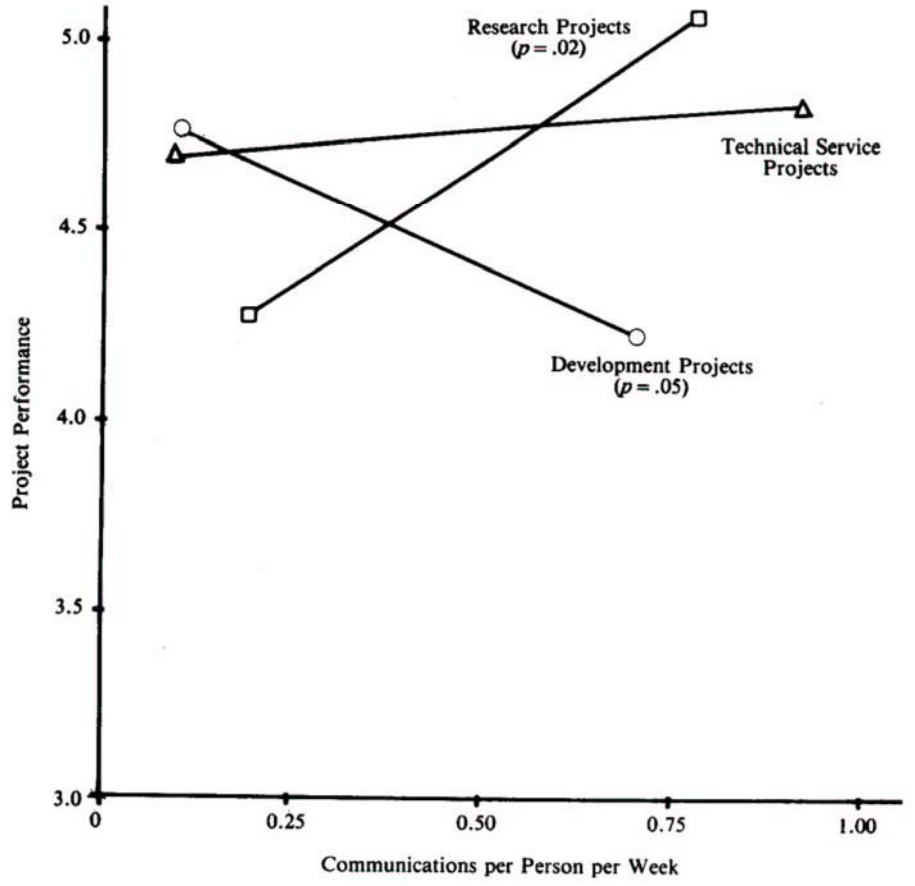
2. Information Seeking Behaviors of Engineer

Different types of engineering work have different information needs and communication patterns.

Different Patterns of Effective Information Flow for Different Types of Technological Work: I. External Communication

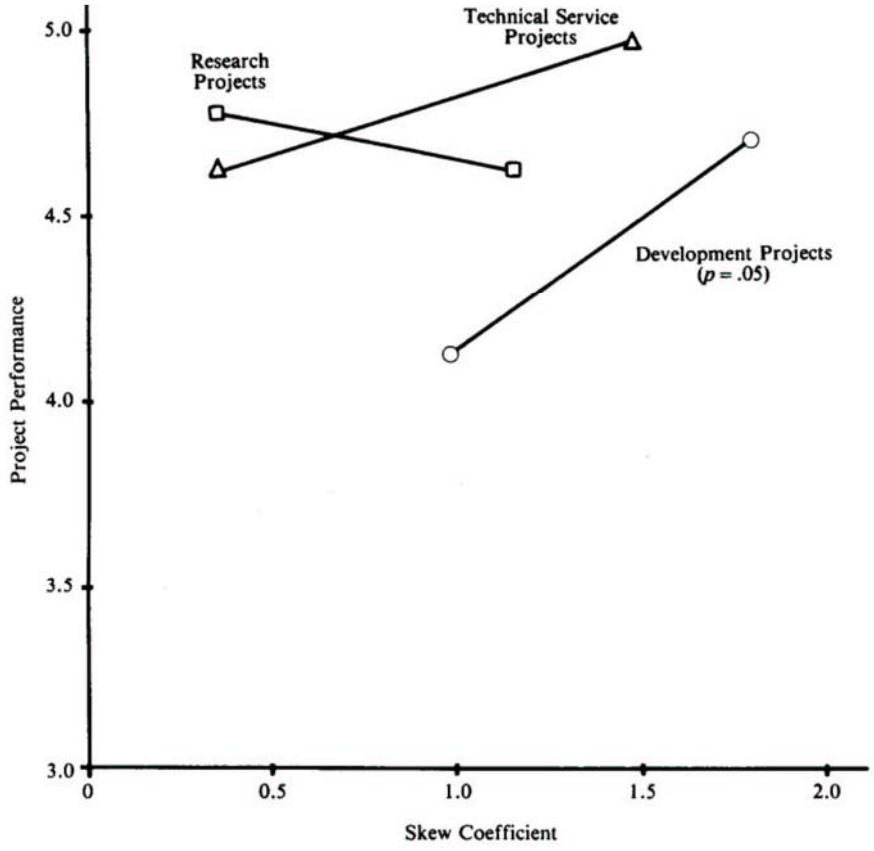
(From: Allen, Tushman and Lee, AMJ, 22(4);1979)

FIGURE 1
Relationship Between Project Performance and the Mean Level of Technical Communication Outside the Organization

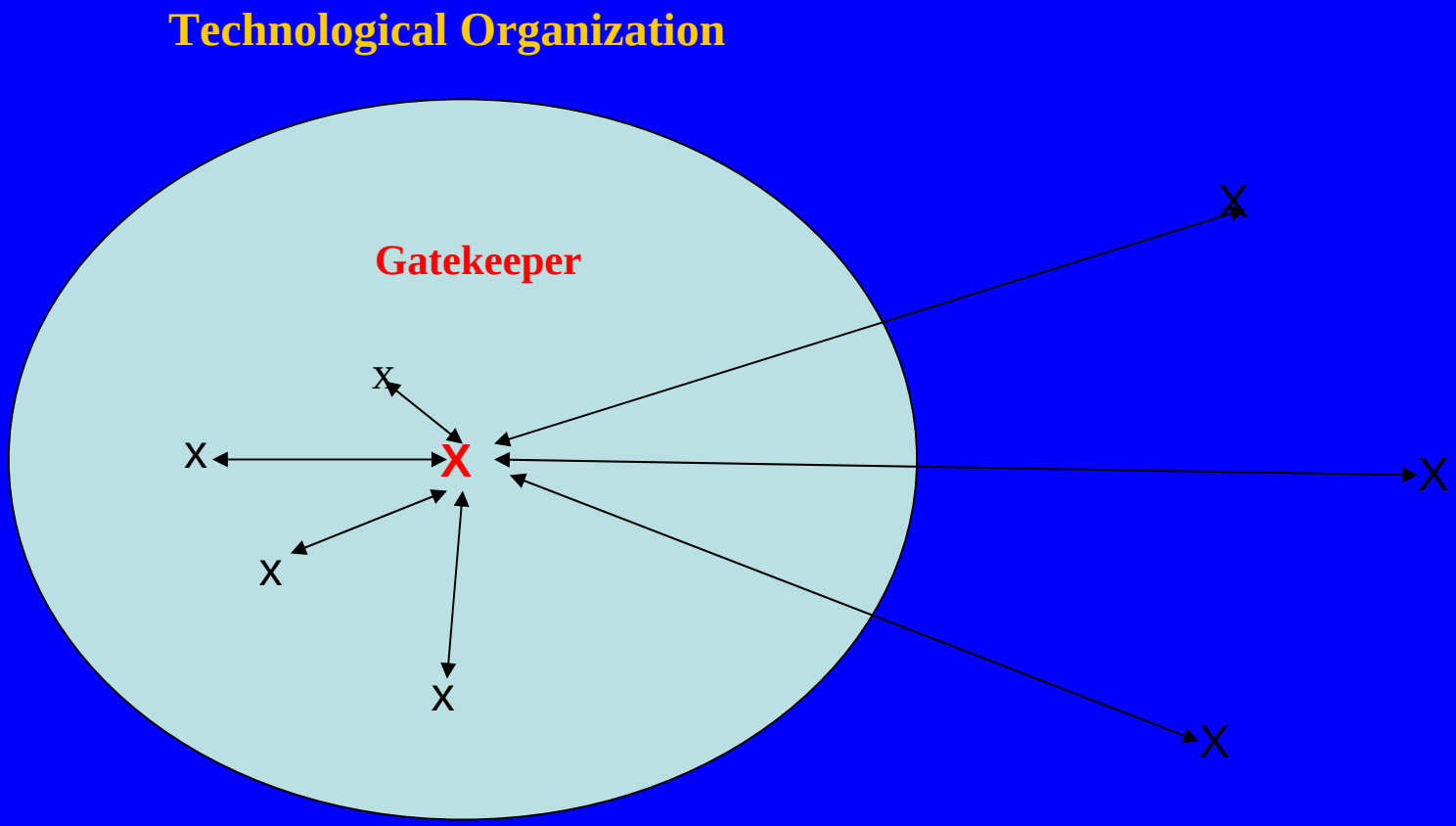


Different Patterns of Effective Information Flow for Different Types of Technological Work: I. External Communication (From: Allen, Tushman and Lee, AMJ, 22(4); 1979)

FIGURE 2
Relationship Between Project Performance and the Degree to Which the Distribution of External Technical Communication Is Skewed Across Project Members



Two-Step Information Flow Process in Technology Through Gatekeepers



Different Patterns of Effective Information Flow for Different Types of Technological Work: II. Internal Communication Within R&D (From: Allen, Lee and Tushman, IEEE Transactions on EM, 1980)

TABLE VI
RELATION BETWEEN PERFORMANCE AND COMMUNICATION WITH THE REST OF THE LABORATORY

Type of Project	N	Intra-Division r	Intra-Division p	Inter-Division r	Inter-Division p
research	14	-0.17	N.S.	-0.34	0.12
development	23	0.31	0.08	0.09	N.S.
technical service	21	0.18	N.S.	-0.47	0.02

TABLE VII
RELATION BETWEEN PERFORMANCE AND THE VARIATION (σ/u) ACROSS PROJECT MEMBERS OF COMMUNICATION WITH THE REST OF THE LABORATORY

Type of Project	N (Project Size > 2)	Intra-Division τ+	Intra-Division p	Inter-Division τ+	Inter-Division p
research	13	-0.17	N.S.	-0.20	N.S.
development	21	-0.25	0.06	-0.27	0.04
technical service	15	-0.02	N.S.	0.15	0.21

+τ = Kendall's Tau

Different Patterns of Effective Information Flow for Different Types of Technological Work: III. Internal Communication Within the Company (From: Allen, Lee and Tushman, IEEE Transactions on EM, 1980)

TABLE IX
RELATION BETWEEN PERFORMANCE AND FUNCTIONAL AREAS OUTSIDE OF THE R&D LABORATORY

Type of Project	N	marketing r	marketing p	production r	production p	other r	other p
research	14	0.12	N.S.	0.20	N.S.	0.21	N.S.
development	23	0.44	0.02	0.36	0.05	0.01	N.S.
technical service	21	0.20	N.S.	0.02	N.S.	0.21	N.S.

TABLE X
RELATION BETWEEN PERFORMANCE AND THE VARIATION (σ/u) IN PROJECT MEMBERS' COMMUNICATION WITH OTHER PARTS OF THE FIRM

Type of Project	N (Project Size > 2)	τ	p
research	13	0.05	N.S.
development	21	-0.21	0.09
technical service	15	0.14	N.S.

Application of Communication Pattern Analysis to Investigate Different Management Problems in RD&E

- Study of RD&E project performance in technology companies
- Study of technology transfer
- Study of professional development of young engineers

Comparison of External Communication between New Hires and Veterans by Type of R&D Work

TABLE V

Comparison of External Communications By Veterans and New Employees as a Function of the Nature of Their Work

Type of R & D Activity		Communications Per Person Per Week: Total External Mean	(Std. Dev.)	With Suppliers Mean	(Std. Dev.)	With Customers Mean	(Std. Dev.)	With External Professionals Mean	(Std. Dev.)
Research	Veterans ($n = 57$)	1.5	(1.5)	0.83	(1.1)	0.20	(0.64)	0.51	(0.81)
	New Employees ($n = 21$)	1.4	(2.2)	0.75	(2.0)	0.21	(0.76)	0.40	(0.80)
		$t = 0.41$* N.S.		$t = 0.18$* N.S.		$t = -0.04$ N.S.		$t = 0.68$ N.S.	
Development	Veterans ($n = 53$)	2.3	(2.3)	1.3	(1.5)	0.58	(0.95)	0.47	(0.74)
	New Employees ($n = 22$)	3.1	(3.9)	1.2	(1.3)	0.97	(2.4)	0.94	(1.7)
		$t = -0.91$* N.S.		$t = 0.13$ N.S.		$t = -0.75$* N.S.		$t = -1.28$* N.S.	
Technical Service	Veterans ($n = 57$)	2.6	(3.0)	1.3	(1.6)	0.64	(1.3)	0.72	(1.7)
	New Employees ($n = 23$)	2.1	(2.6)	0.75	(1.1)	0.65	(1.2)	0.74	(1.9)
		$t = 0.68$ N.S.		$t = 1.70$ $p = 0.09$		$t = -0.05$ N.S.		$t = -0.05$ N.S.	

2 tailed t-test based on pooled estimates unless indicated by *.

*2 tailed t-test based on separate variance estimates when variance differs significantly, i.e., $p < 0.10$.

N.S. = Not statistically significant, $p > 0.10$.

Contrast Between Communication Pattern of High vs. Low Performance Young Coop Engineers

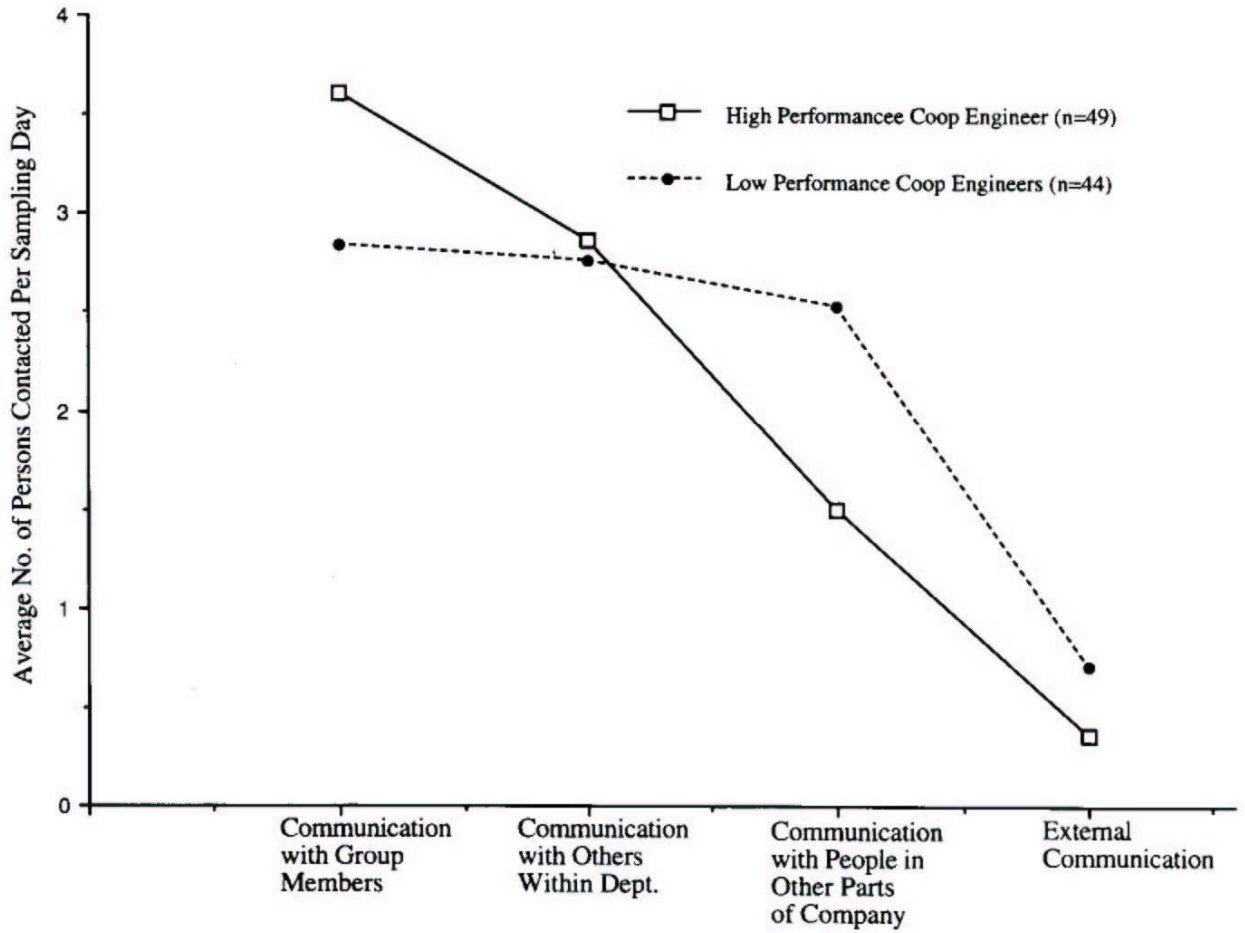


Fig. 2. Comparison of communication patterns between high and low performance coop engineers.

Social Ties, Communication Pattern and Job Performance of Young Coop Engineers

Table 3
Two-way analysis of job performance by social ties

A. Two-way table of job performance by social ties

		Social ties with professional staff: No	Social ties with professional staff: Yes
Social ties with other coop engineers	No	Avg. perf=0.54 Rel. percentile=43% n=89	Avg. perf=1.13 Rel. percentile=66% n=26
	Yes	Avg. perf=0.04 Rel. percentile=24% n=10	Avg. perf=0.84 Rel. percentile=54% n=34

B. Two-way analysis of variance

Source of variation	Sum of squares	*df*	Mean squares	*F*	Significance
Main effects	11.67	2	5.83	6.84	0.001
Social ties with professional staff within organization	11.66	1	11.66	13.66	<0.001
Social ties with coop engineers	3.29	1	3.29	3.86	0.051
2-way interactions	0.24	1	0.24	0.28	0.601
Explained	11.90	3	3.97	4.65	0.004
Residual	132.25	155	0.85		
Total	144.15	158	0.91		

3. Information Seeking Behaviors by Information Systems Workers and Users

Study of personal computer diffusion and management

Research question:

When personal computers first emerged in the early 1980s, what accounted for its rapid growth and diffusion?

3. Information Seeking Behaviors by Information Systems Workers and Users

- Typical reasons offered for the rapid growth of pcs:
- User friendliness
- Desire to own private machines

3. Information Seeking Behaviors by Information Systems Workers and Users

- Empirical study of pc usage and consultation patterns in six companies
- Parallel study of pc usage and consultation patterns in two divisions of the same company.

3. Information Seeking Behaviors by Information Systems Workers and Users

Table 6. Sources of Information For Personal Computer Users

Informal Sources	% of Respondents Reporting Usage	Average No. of People Consulted	Usefulness (1 = Not at all, 5 = Extremely)
Colleagues	89.4%	3.76	4.00
Systems Staff	48.0%	1.45	3.42
Vendors	45.9%	1.58	2.85
Friends and Relatives	28.4%	0.68	3.11
Computer User Group	16.9%	0.57	2.62
Others	3.5%	0.07	2.33
Formal Sources:	**% of Respondents Reporting Usage**	**Average No. Read or Subscribed**	**Satisfaction With Information**
Journals	39.2%	0.82	3.19
Manuals and Documents	—	—	3.14

3. Information Seeking Behaviors by Information Systems Workers and Users

Table 8. Comparison of Information Sources

	Division A (With planning)		Division B (With no planning)	
Informal Sources:	**Average No. of People Consulted**	**Satisfaction**	**Average No. of People Consulted**	**Satisfaction**
Colleagues	3.16*	4.21	2.20*	4.00
Systems Staff	1.96**	3.86**	0.78**	3.14**
Vendors	0.60	2.53	1.15	2.88
Friends & Relatives	0.30	3.00	0.45	3.14
Computer User Group	0.35	2.78	0.08	2.29
Others	0.08	2.50	0.00	—
Formal Sources:	**% of Respondents Reporting Usage**	**Satisfaction**	**% of Respondents Reporting Usage**	**Satisfaction**
Journals	0.54	2.84	0.77	2.82
Manuals & Documents	—	3.11	—	3.11

*$p < 0.10$ for differences between the two groups

**$p < 0.05$ for differences between the two groups

4. Understanding User Experience

Using input from user experience for product and quality design.

4.1 Integrating User Experience Into Product Design

- In many traditional NPD process, design was passed along to the artists and marketers only after the R&D had been completed. Design was thus included only as an after thought and not considered as a central part of the NPD process to be included from the onset.
- Under this old approach, design was largely limited to esthetic considerations.

4.1 Integrating User Experience Into Product Design

- However, the neglect of design in the NPD process has led to the failure of many products and the decline of many companies.

  For example:

  In the 1980s, Texas Instruments missed many market opportunities in spite of their dominance in the microchip technologies because of their lack of expertise in design.

  Over the last 15 years, Motorola first lost its leadership position in cell phones to Nokia because of poor designs, and lately Nokia has been losing ground to Samsung on design and product success.

4.1 Integrating User Experience Into Product Design: Excellent Design can Play a Major Role in the Success of a New Product

4.1 Integrating User Experience Into Product Design

The current approach to effective design by leading companies focuses on the total “user experience”, rather than just looks or esthetics.

Thus, the key is find ways to obtain users’ input, both conscious and sub-conscious, about their experiences for different design configurations as an integral part of the new product development process.

4.1 Integrating User Experience Into Product Design

A well designed product is one that users feel good about, or even fall in love with, sometimes without even knowing why.

Think about listening to a good song, or playing an addictive computer game.

4.2 Example of How a Highly Regarded Consulting Firm Helps Major Corporations to Approach Design

Methods for Understanding User Experience

1. Observation
2. Rapid Prototyping

Methodologies for Observation

Observation may involve:

- Shadowing: following a user
- Behavioral Mapping: photographing users in a space over two or three days
- Consumer Journey: Keeping track of all the interactions a consumer has with a product, service, or space.
- Camera Journals: Asking users to keep visual diaries of their activities and impressions relating to the product.
- Extreme User Interviews: Talking to people who really know – or know nothing – about a product.
- Storytelling: Prompting consumers to tell stories about their personal user experiences.
- Unfocus Groups: Interviewing a diverse group of different users.

Example for Hospital Redesign

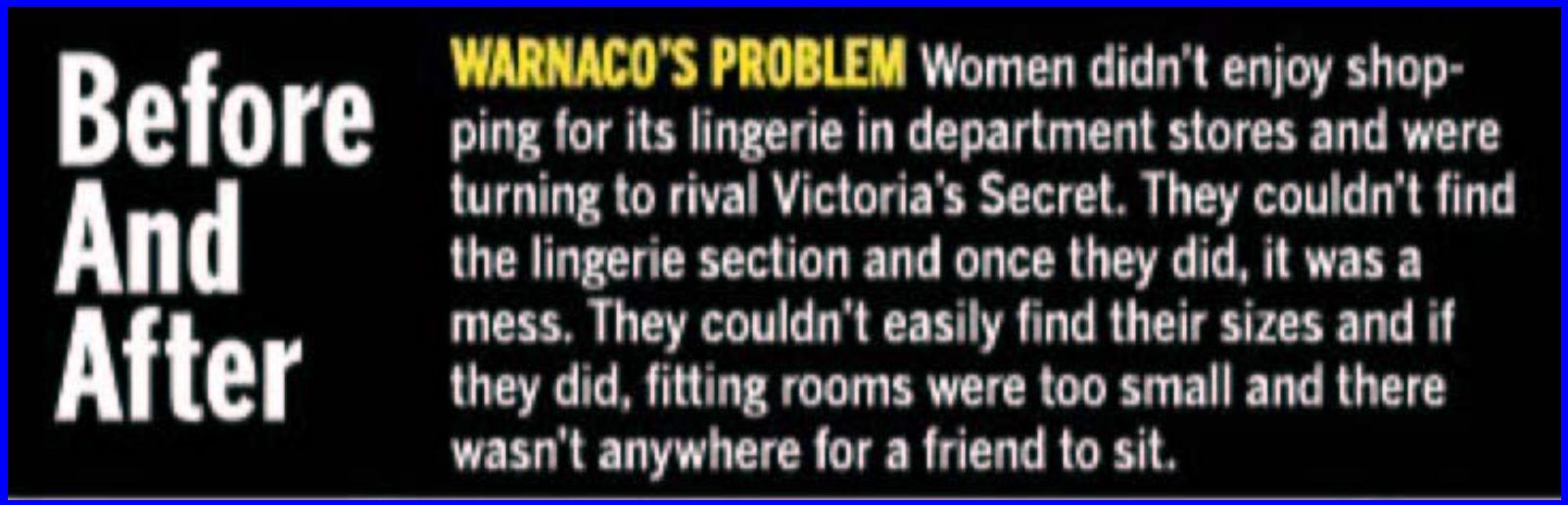
- Example: Redesign of hospitals for the Kaiser Group – the largest Health Maintenance Organization in the US.

  Observation studies showed that many patients and their families became annoyed well before seeing a doctor because the check-in process was a nightmare and the waiting rooms were uncomfortable. Also, the doctors and the medical assistants and testing were located far apart. And, patients, including some old people and others who need assistance, were often forced to wait alone for long periods of time in a threatening environment, half-naked and without the company of their family members or close friends.

  The solution lies in the redesign of the facilities and the process, but not the investment of new buildings as originally expected.

Example of a Ideo Project: Before

Example of a Ideo Project: The Problem



Example of a Ideo Project: The Solution

IDEO'S SOLUTION Create a "gateway" to welcome consumers to the lingerie area. Have a concierge to provide help in finding styles and sizes. Create a social hub for friends to sit and talk. Place "storytellers" —two-sided displays that tell a fashion story on one side with lingerie on the other—around the floor. Place dispensers at the back to hold basics.

Example of a Ideo Project: After

Rapid Prototyping

- Mocking up working models to help everyone visualize possible solutions and speed up decision-making and innovation. Some guidelines:
- Mock up everything including both products and services.
- Make short videos or movies to depict the user experience.
- Go fast in building mock-ups quickly and cheaply.
- No frills – make prototype that demonstrates the design ideas but not the fine details.
- Create scenarios showing different people using services in different ways and examine different design options.
- Bodystorm – Delineate different types of users and act out their roles.

Application of Rapid Prototyping Methodology to Software Development

Conceptual Approach to Software Development:

- Top down design
- Bottom up implementation (use of rapid prototyping to obtain user input for designing and building user interface.)

4.2 Using User Experience to Design Quality of Services

- What is quality of service delivery?

4.2 Using User Experience to Design Quality of Services

- Quality: Meeting User Expectations

  Two parts:

  1. Setting up expectations
  2. Meeting them

4.2 Using User Experience to Design Quality of Services

- Example: Waiting for services at a bank

Summary

Using various research methodologies to gather data on people's communication behaviors and user experiences, we can obtain good insights into how to manage technological work and design successful new products and services.