Part I: Conceptualizing the Information Highway

by
Eric W. Stein, Ph.D.

Overview

- Defining the Information Superhighway
- Communication Paradigms
- Characteristics of the Info Highway
- Information Stocks and Flows

Information Stocks

- Encodings of transactions, expertise, etc.
- May be stored on paper, floppy disks, hard disks, CD-ROMS
- Each means of storage has different capacities

Storage Capacities

<table>
<thead>
<tr>
<th></th>
<th>Capacity (kb)</th>
<th>Use</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet of paper</td>
<td>3</td>
<td>read/write</td>
<td>portable</td>
</tr>
<tr>
<td>Floppy disk</td>
<td>1200</td>
<td>read/write</td>
<td>portable</td>
</tr>
<tr>
<td>Hard disk</td>
<td>250,000</td>
<td>read/write</td>
<td>not port.</td>
</tr>
<tr>
<td>CD-ROM</td>
<td>500,000</td>
<td>read</td>
<td>portable</td>
</tr>
</tbody>
</table>
Information Flows

- Information can be transferred from place to place
- Requires channels
- Channel capacity determined by channel characteristics

Channel Capacity

- Copper wire - low capacity
- Fiber optic cable - high capacity

Information Highway Architecture

- Each node on the network accumulates information
- Nodes are connected via channels; e.g., fiber optic
- Information flows through the channels provided
- The type of channel determines the quantity of flow

E.g., The Information Highway
Function of the Information Highway

- "Facilitate the exchange of information between nodes to promote communication and decision-making"

Communication: The Exchange of Information

Dimensions that Distinguish Communication

- Directionality
- Number of Participants
- Media Type and Richness
- Time and Distance

Directionality of Communication

One Way

Two Way
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-Concepts and Definitions-
-Doing Business-

Number of Participants

One SENDERs Many

One RECEIVERS Many

Media Richness

Based on the variety of information conveyed to the senses
Data, images, sound, motion, smell, touch, taste

Media Types by Richness

<table>
<thead>
<tr>
<th>Richer</th>
<th>Data</th>
<th>Sound</th>
<th>Sight</th>
<th>Motion</th>
<th>Smell</th>
<th>Touch</th>
<th>Taste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letters, fax, e-mail</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>XX</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactive video</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face to face</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td></td>
</tr>
</tbody>
</table>

Time and Distance

<table>
<thead>
<tr>
<th>TIME OF INTERACTION</th>
<th>Same Time</th>
<th>Different Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROXIMITY</td>
<td>Near</td>
<td>Face to Face</td>
</tr>
<tr>
<td></td>
<td>Far</td>
<td>Telephone</td>
</tr>
</tbody>
</table>
E.g.: Face to Face Conversation

- Two-way
- One to one
- Richness-high
- Close proximity and simultaneous

E.g. Telephone Conversation

- Two-way
- One to one
- Richness-medium
- Far and simultaneous

E.g.: Mass Media Communication

- One way
- One to many
- Richness-medium to high
- Far distances-simultaneous or lagged

E.g.: Telephone Help desk

- Two way
- Many to one
- Richness-medium
- Far distances-simultaneous
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E.g.: E-mail

- One way
- One to one; one to many; many to one
- Richness-low
- Far distances-Lagged

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Summary of Media Characteristics

<table>
<thead>
<tr>
<th>Media</th>
<th>Directionality</th>
<th>Participants</th>
<th>Space</th>
<th>Time</th>
<th>Richness</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>one way</td>
<td>one to one or one to many or many to one</td>
<td>far</td>
<td>lagged</td>
<td>low</td>
</tr>
<tr>
<td>Telephone</td>
<td>two way</td>
<td>one to one</td>
<td>far</td>
<td>simult.</td>
<td>medium</td>
</tr>
<tr>
<td>Face to Face</td>
<td>two way</td>
<td>one to one</td>
<td>near</td>
<td>simult.</td>
<td>high</td>
</tr>
<tr>
<td>Television</td>
<td>one way</td>
<td>one to many</td>
<td>far</td>
<td>simult. or lagged</td>
<td>medium to high</td>
</tr>
<tr>
<td>Information Highway</td>
<td>two way</td>
<td>all</td>
<td>far</td>
<td>simult. or lagged</td>
<td>medium to high</td>
</tr>
</tbody>
</table>

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Directionality of the Information Highway

- Both one way and two way by choice

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Space and Time on the Information Highway

- Close or far distances
- Simultaneous or lagged
Participation on the Information Highway

- One to one
- One to many
- Many to one
- Many to many

The Information Highway is Media Rich!

Doing Business on the Information Highway

by Eric W. Stein, Ph.D.
Why use the Information Highway for Business?

- Keep up with trends and developments in the environment
- Competitive advantage!
- Sell Products and Services
  - e.g., electronic commerce

Objective 1: Keep up with Trends and Developments

A company's contextual environment is multidimensional
Use the information highway to keep abreast of trends and developments

Dimensions to the Contextual Environment

- Economic dimension
- Political-legal dimension
- Technological dimension
- International dimension
- Sociocultural dimension

Economic Environmental Scanning

- Scan Government Economic Reports
  - Government Account Office (GAO)
  - Economic Bulletin Board (Dept. of Commerce)
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Political-legal Environmental Scanning
- Scan Government Regulations
  - Federal Register
  - EPA

Technological Environmental Scanning
- Scan Government Technical Reports
  - Office of Technology Assessment
  - NSF

International Environmental Scanning
- Scan News Reports
  - Access newspapers and journals thru LIAS
- Scan Foreign Laws and Regulations
  - Library of Congress

Sociocultural Environmental Scanning
- Scan News and Journal Reports
  - Access newspapers and journals thru LIAS
- Scan the Web using a Search Engine; e.g., Alta Vista
  - Source credibility?
**Biz Opportunity Scanning**

- Look for work on the information highway!
  - Commerce Business Daily

**Objective 2: Competitive Advantage**

To secure competitive advantage, formulate a strategy...

**Formulate a Competitive Strategy**

- Articulate a vision for the organization
- Formulate a competitive strategy that will realize your vision...

**Competitive Strategies**

- Cost Strategy-Make it cheaper
- Product Differentiation Strategy-Make it better
- Market Strategy (geographical or demographic)-Deliver it where needed
Competitive Strategy (cont.)

- Choose one strategy and stick to it
- The strategy you choose will determine the degree to which you network with various stakeholders on the information highway...

Stakeholders

- A stakeholder is anyone who is affected by and can affect the performance of the organization
- Different levels of stakeholders...

Stakeholder Groups

- Internal organization stakeholders
- Value chain stakeholders
- Transactional stakeholders
Role of the Information Highway

- Facilitates communication (e.g., e-mail, interactive video)
- Helps manage stocks and flows of all types of information (e.g., data, images, sound, video)
- The Information Highway can support the activities of each of the stakeholder groups...

Stakeholder Support by Competitive Strategy

- Cost Strategy - focus on internal operations and value chain
- Product differentiation - focus on value chain and transactional environment
- Market Strategy - focus on transactional environment

Example: Information Highway Support

- Support for internal stakeholders
- Support for value chain stakeholders
- Support for transactional stakeholders
Support for Internal Stakeholders

- Employees are primary internal stakeholder
- Maximize value-adding activities within organization with info highway

Who's supporting employees with the Info Highway?

- Oracle Software Company
  - Offices in 45 cities in the US and 50 countries
  - Ties to subsidiaries in 96 countries
  - Internet is a vital component to company’s overall network
  - “It’s fast and cost effective...it gives offices which were out of the loop...the links they are requesting” (Grantham, Net Services)

Who’s supporting employees? (cont.)

- IBM
  - A 1992 study by IBM found that 35% of those surveyed indicated that the Internet was used to “communicate with peers.”
  - Most popular use of Internet cited in survey
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-Concepts and Definitions-
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Who's Supporting internal R & D with the Info Highway?

- Apple-IBM
  - Power PC platform development project
  - Taligent-object oriented operating system project
- Global Basins Research Project
  - New ways of searching for oil deposits
  - Collaboration among several universities, government agencies, oil companies

Support for Value Chain Stakeholders

- Suppliers
- Distributors

*Suppliers/Distributors (V1)

<table>
<thead>
<tr>
<th>Suppliers/Distributors</th>
<th>PRICING/ORDERING</th>
<th>DELIVERY INVENTORY</th>
<th>PRODUCT SUPPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS BENEFITS</td>
<td>Easy access</td>
<td>Faster turnover</td>
<td>Access to product expertise</td>
</tr>
<tr>
<td></td>
<td>Up-to-date information</td>
<td>Improved planning</td>
<td>Faster problem resolution</td>
</tr>
<tr>
<td></td>
<td>Not locked into proprietary system</td>
<td>Better inventory management</td>
<td></td>
</tr>
<tr>
<td>INFO TYPE(S)</td>
<td>Data</td>
<td>Data</td>
<td>Data</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>e-mail</td>
<td>e-mail</td>
<td>e-mail</td>
</tr>
<tr>
<td>ALTERNATIVES</td>
<td>Fax, EDI</td>
<td>Fax, EDI</td>
<td>Fax, telephone</td>
</tr>
<tr>
<td>COMPETITIVE STRATEGY</td>
<td>Cost</td>
<td>Cost</td>
<td>Cost, market</td>
</tr>
</tbody>
</table>

Who’s Supporting Suppliers/Distributors?

- Greenville Tool and Die
  - Orders for parts are downloaded from customers by modem
  - CAD designs are encoded in a DB and sent to suppliers via Internet
  - Statistical test data are sent back to customers for approval electronically
Greenville (cont.)

• Greenville serves as beta tester of new CAD software for its supplier
  • "because we are both on the Internet, we can act as a beta test site for their most advanced software. Computervision transmits the software over the network, we load it and put it through the process. If there is any problem, we can send back a problem report on the Internet...that speeds up the whole timeframe..."

Support for Transactional Stakeholders

• Customers
• Owners
• Unions
• Strategic allies
• Regulators

Who's Supporting Customers with the Info Highway?

• IBM
  • Of their total use of the Internet, 26% of the time was spent in dealing with customers.
  • Second only to communication with peers

*Customers (T1)

<table>
<thead>
<tr>
<th>Customers</th>
<th>MARKETING/RESEARCH</th>
<th>SALES DISTRIBUTION</th>
<th>CUSTOMER SUPPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS BENEFITS</td>
<td>Data for market research</td>
<td>Reach new customers</td>
<td>Manage more customers</td>
</tr>
<tr>
<td>INFO TYPE(S)</td>
<td>data, video</td>
<td>data, images, sound, video</td>
<td>data, images, sound, video</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>e-mail, multimedia</td>
<td>e-mail, multimedia</td>
<td>e-mail, multimedia</td>
</tr>
<tr>
<td>ALTERNATIVES</td>
<td>Letters, telephone</td>
<td>Mailings, TV, print</td>
<td>Telephone, fax</td>
</tr>
<tr>
<td>COMPETITIVE STRATEGY</td>
<td>Differentiation, market</td>
<td>Market</td>
<td>Differentiation, market</td>
</tr>
</tbody>
</table>
Who's Supporting Customers (cont.)

- Schlumberger
  - Specializes in oil well and seismic surveys
  - Set up SNIC network: Schlumberger Network Interconnect Center
  - SNIC is a place where test data can be archived for retrieval by customers
  - Company can respond immediately to requests for more data
  - Access to network requires special security

Who's Supporting Strategic Alliances

- Rockwell International
  - “We want to have the capability of connecting to potential business partners, and making new alliances whenever opportunity arises. To accommodate that, we have to maintain a gateway to the rest of the world. The Internet is a global point of presence for Rockwell.”

Other Examples

- Federal Express and UPS
  - Customers can track packages and get updates
- Silicon Graphics, Apple Computer and many others
  - See the latest products and services
- IBM
  - Communicate with broad constituencies;

Examples (cont.)

- Kodak
  - Show off latest images
- Bank of America, Virtual USA
  - True home banking from your computer
- MTV, ESPN
  - When they are not on the TV, get ’em on the Internet
Part III: Strategy for Getting on the Info Highway

Getting the most out of the Information Highway

....start with a vision for the organization....

1a. Set Objectives

- Where do you see your company in five years? Ten years?
- Hint: Don’t be constrained by the past. Idealize!
- Exercise: Draw a picture of your company now and in five years

1b. Set Objectives (cont.)

- Scan for trends and developments?
- Secure competitive advantage?
- Sell products and services?
2. Identify Your Stakeholders

- Use the vision to guide your direction on the information highway.
- Identify the key stakeholders you wish to support
  - Employees
  - Suppliers
  - Customers
  - Partners

3. Identify Information Technologies Needed

- Determine which information technologies you need:
  - Email only
  - Partial Internet access (e.g., AOL)
    - Limited browsing ability, lower speed, less secure
  - Full Internet access (ppp/slip)
    - Full browsing ability, forms, high speed, high control, security

Summary

- The Information is crucial to business
  - In 2-3 years companies NOT using this tool will be at a competitive disadvantage
- The Information highway is best approximated by the Internet
- Strategize Internet use and find an Internet provider
- Find an entrance ramp and...go!