Storage:
The Unnoticed Revolution

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Disk Storage Capacity for $2500.

Doubling time = 1 year
Disk Storage Capacity for $2500.

- MAD limit: 40 %/year
- Doubling time = 1 year

Year →

- 1 TB
- 100 GB
- 10 GB
- 1 GB
- 100 MB
- 10 MB
Find the Boundaries

Netnews, Bulletin Boards

E-Mail

Publishers, Booksellers, Newsdealers

Library

Gov't Data

Data Base Collectors

Preprints
<table>
<thead>
<tr>
<th>Year</th>
<th>Device</th>
<th>Service Type</th>
<th>RAM Capacity</th>
<th>Disk Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>PC</td>
<td>Time-Sharing Service</td>
<td>256 KB</td>
<td>5/10 MB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8 MB</td>
<td>.3/3 GB</td>
</tr>
<tr>
<td>1993</td>
<td>Powerbook</td>
<td>Storage Service</td>
<td>8/16 MB</td>
<td>80/160 MB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.5/1 GB</td>
<td>10/100 GB</td>
</tr>
<tr>
<td>2003</td>
<td>PDA</td>
<td>Information Service</td>
<td>400/800 MB</td>
<td>2/4 GB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50/100 GB</td>
<td>1/10 TB</td>
</tr>
</tbody>
</table>
The Driving Forces

\[
\frac{\text{Cost(Image – Disk)}}{\text{Cost(Paper)}} = \begin{bmatrix}
10(1993) \\
1.0(1998) \\
0.1(2003)
\end{bmatrix}
\]

\[
\frac{\text{Space(Image – Disk)}}{\text{Space(Paper)}} = \begin{bmatrix}
1.0(1993) \\
0.1(1998) \\
0.01(2003)
\end{bmatrix}
\]
1 MegaBook Library in 1999

Form: Scanned image
Medium: Magnetic disk
Access: 20 ms
Space: 15 sq M
Cost: $3M (storage)
Slowly-Changing Storage Ratios

(1993 values)

\[
\frac{\text{RAM}}{\text{Disk}} = \frac{25(\text{Dollars}/\text{MB})}{1(\text{Dollars}/\text{MB})} = 25
\]

\[
\frac{\text{Image}}{\text{ASCII}} = \frac{100(\text{KB}/\text{Page})}{4(\text{KB}/\text{Page})} = 25
\]

Indexes → RAM
A Technology-Driven Vision:

1. You can browse through any library holding from your office.

2. You can click on a reference and expect it to appear in an adjacent window.
The Action...

Discovery
Alerting

Mobility + Information Access = Killer Applications

Boundaries

Finding Things