Storage:
The Unnoticed Revolution

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Disk Storage Capacity for $2500.

Year ——> 83  85  87  89  91  93  95  97  99  01

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

MAD LIMIT 40% / yr

Doubling time = 1 year

Year ->
## Size, by Decade:

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

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

\[
\frac{\text{Space(Image - Disk)}}{\text{Space(Paper)}} = \begin{bmatrix} 0.1 \ (1993) \\ 0.01 \ (1998) \\ 0.001 \ (2003) \end{bmatrix}
\]
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)

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

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

Indexes \[\rightarrow\] 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

\[
\text{Finding Things}
\]

Mobility + Information Access
= Killer Applications

Boundaries