CSI: IT (Information Technology)

Following the evidence of IT spending

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Howard Rubin: Background

- Professor Emeritus of Computer Science, Hunter College of CUNY; CEO Rubin Systems, Inc.; Gartner Senior Advisor; former META Group Research Fellow, former Nolan Norton Research Fellow

- 30 years of benchmarking experience; creator of Worldwide IT Trends and Benchmark Database; originator of IT “Dashboard/Scorecard” construct


- Global activities include: Advisor to White House and US Government; National Technology Strategy for Canada, India, Philippines, Singapore, South Africa and G-8/UN Support
Today’s Topics

- Mapping the Trends: Basic IT Economics
- The Evidence: Industry Data, Context, and Observed Phenomena
- Is the Evidence Misleading? -- Some New Views
  - Total Technology Benchmarking
  - Market Basket Analysis
  - Agility and IT
- Back in the “Crime Lab” - Areas for Further Investigation
- Conclusion(s)
- Case Opened or Closed??
Background and Research Agenda

- **Background**
  - In the search for the “Holy Grail” of the relationship between Information Technology investment and business performance, most researchers (and consulting firms) have concentrated on the relationship of two variables that are too simplistic to explore this phenomena – IT spending and revenue.
  - It is time to go beyond such basic models and explore this space in new ways to both explain this new (and intensive) aspect of business and economic dynamicism and to provide a sound quantitative basis for providing guidance to leaders in the private and public sectors.

- **Research Agenda**
  - To map trends and business performance results using a dataset encompassing a 20-year history on over 2,000 companies.
  - To expanded the scope of this research domain to include process variables, industry specific dynamics, and capital investment beyond IT.
Some Ideas to Think About……..

- The new pivotal issue is “managing technology as a business” – not just IT
- Perhaps information technology costs do not have to increase with business growth – can we invert the model?
- The hidden IT inventory is growing – how should it be managed?
- Technology innovation investment must be managed from “a room with a view”..... In the Run Grow Innovate model -- “I” must be protected – the growing inventory fights this
- Maybe there aren’t overall technology trends... maybe there are micro-climates with super-cells of innovation
- There has to be something next in the technology management and governance maturity model besides just making the CFO responsible
- Just looking at IT spend gives a false reading on business and technology – the total technology picture must be managed (back to “A room with a view”) and understood
- Is there really an IT??
Mapping the Trends: Basic Economics

- It is quite interesting to overlay recent computing “eras” with US economic data
As information technology evolved, business costs and investment in technology increased and added a new component to the cost of doing business.
As information technology evolved, business costs and investment in technology increased and added a new component to the cost of doing business – this component accelerated!

- **IT Spending 1980-1990**
  - $600B
- **IT Spending 1990-2000 (neglecting Y2K impacts)**
  - $3,000B or $3T
- **IT Spending 2000-2005**
  - $4,300B or $4.3T
The magnitude of IT investment is astounding for some companies. There are 94 countries/territories (of 231) with GDP’s less than Citibank’s IT budget of approximately $10B annually.
The trend continues today and despite economic changes, year over year IT spending is taking an ever increasing “chunk” of business revenue.

This in turn drives the need to generate value from technology as a multiple of the investment level.

Mapping the Trends: Basic Economics
Year over year, IT costs continue to be an increasing cost of the cost of doing business
IT spending per employee annually is approaching 30% of the average US yearly salary.
The IT inventory is the “hidden inventory” growing in the majority of sectors
In Banking, Financial Services, Media, Information Processing, Electronics, and Telecommunications, IT intensity has companies caught up in a “torrent” of rapidly rising investment.

But this is only part of the picture.....
Industry Data: The Classic IT Spending Pattern

- Take a few thousand companies with Revenue from $500M to $250B and do a regression............

\[ y = 0.0349x + 60.156 \]

\[ R^2 = 0.7916 \]

IT Spend Versus Revenue (2005)
Industry Data: The Classic IT Spending Pattern
Insurance and Financial Services

- Industries have their unique profiles...with business implications
  - Will transforming an insurance company to a diversified financial services company require a new financial model for IT investment?
Industry Data:
IT Spending per Company Employee

 Represents organizations with over $1B Revenue
Industry Data: IT Spending as a % of Gross Revenue

Represented organizations with over $1B Revenue
Industry Data:
IT Spending as a % of Company Operating Expense

Metals/Natural Resources: 1.5%
Construction & Engineering: 2.1%
Energy: 2.2%
Utilities: 2.3%
Retail: 2.5%
Food/Beverage Processing: 2.8%
Chemicals: 2.8%
Government: 3.1%
Transportation: 3.2%
Education: 3.4%
Consumer Products: 4.0%
Electronics: 4.5%
Information Technology: 4.6%
Manufacturing: 4.8%
Insurance: 4.8%
Pharmaceuticals: 4.9%
Media: 5.2%
Health Care: 5.9%
Professional Services: 6.2%
Hospitality & Travel: 6.6%
Telecommunications: 7.5%
Banking: 9.7%
Financial Services: 13.2%

Database Average: 5.3%

Represents organizations with over $1B Revenue
Industry Data: IT Employees as a % of Company Employees

<table>
<thead>
<tr>
<th>Industry</th>
<th>IT Employees as % of Company Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals/Natural Resources</td>
<td>1.0%</td>
</tr>
<tr>
<td>Education</td>
<td>1.3%</td>
</tr>
<tr>
<td>Food/Beverage Processing</td>
<td>1.7%</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>1.8%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2.1%</td>
</tr>
<tr>
<td>Retail</td>
<td>2.1%</td>
</tr>
<tr>
<td>Construction &amp; Engineering</td>
<td>2.5%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>2.6%</td>
</tr>
<tr>
<td>Information Technology</td>
<td>3.7%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>4.0%</td>
</tr>
<tr>
<td>Electronics</td>
<td>4.0%</td>
</tr>
<tr>
<td>Energy</td>
<td>4.1%</td>
</tr>
<tr>
<td>Banking</td>
<td>5.5%</td>
</tr>
<tr>
<td>Transportation</td>
<td>5.9%</td>
</tr>
<tr>
<td>Media</td>
<td>5.9%</td>
</tr>
<tr>
<td>Utilities</td>
<td>6.0%</td>
</tr>
<tr>
<td>Hospitality &amp; Travel</td>
<td>6.1%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>6.7%</td>
</tr>
<tr>
<td>Professional Services</td>
<td>6.8%</td>
</tr>
<tr>
<td>Health Care</td>
<td>8.0%</td>
</tr>
<tr>
<td>Financial Services</td>
<td>8.7%</td>
</tr>
<tr>
<td>Insurance</td>
<td>10.0%</td>
</tr>
<tr>
<td>Database Average</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

Represents organizations with over $1B Revenue
Industry Data: Forecasted Spending by Industry

- Retail: -4.9%
- Professional Services: -1.7%
- Transportation: -0.2%
- Hospitality & Travel: 0.0%
- Telecommunications: 0.0%
- Metals/Natural Resources: 0.0%
- Manufacturing: 1.2%
- Food/Beverage Processing: 1.3%
- Banking: 1.5%
- Government: 2.4%
- Media: 2.9%
- Utilities: 3.1%
- Pharmaceuticals: 3.3%
- Financial Services: 3.7%
- Energy: 3.9%
- Education: 4.1%
- Health Care: 4.6%
- Information Technology: 4.7%
- Construction & Engineering: 4.9%
- Chemicals: 5.1%
- Insurance: 6.5%
- Electronics: 7.8%
- Consumer Products: 7.9%
- Database Average: 3.2%

Represents organizations with over $1B Revenue.
Context: Agility Mapping 2001-2006

Change in IT spend (in $)
vs. Revenue Change

- Limited scalability
  - IT spending decline in step with revenue decline
  - Good Scalability
- IT spending growth in step with revenue growth

Change in IT spend (in $)
vs. Operational Expense Change

- Limited scalability
  - IT spending growth as OpEx increases
  - Good Scalability?
- IT spending decline in step with OpEx reduction

△ IT Spend
△ Revenue
△ Opex

All Industries

Represents organizations with greater than $1B annual revenue.
**Context: Agility Mapping**

**IT costs increase as revenues decline: limited scalability?**

**IT spending in tune with revenue growth**
- Banking & Financial Services
- Chemicals
- Construction & Engineering
- Consumer Products
- Education
- Electronics
- Financial Services
- Food/Beverage Processing
- Government

**IT spending in tune with revenue decline**
- Energy
- Telecommunications
- Professional Services
- Retail

**IT spend decreases as revenues increase: scalability or misalignment?**
- Health Care
- Hospitality & Travel
- Information Technology
- Insurance
- Manufacturing
- Media
- Metals/Natural Resources
- Pharmaceuticals
- Utilities
- Banking & Financial Services
- Chemicals
- Construction & Engineering
- Consumer Products
- Education
- Electronics
- Financial Services
- Food/Beverage Processing
- Government
Agility Mapping

IT costs increase as business expenses decline: IT leverage?

IT spending in tune with operational spending:
- Banking & Financial Services
- Chemicals
- Construction & Engineering
- Consumer Products
- Education
- Financial Services
- Food/Beverage Processing
- Government
- Information Technology
- Electronics
- Energy
- Transportation
- Professional Services
- Retail
- Hospitality & Travel
- Insurance
- Media
- Metals/Natural Resources
- Pharmaceuticals
- Telecommunications
- Utilities
- Information Technology

IT spending in tune with operational spending:

IT spend decreases as expenses increase: IT punishment?
Context:
Spending Trends By Industry

**IT microclimates: investment landscape varies by industry**

Colored areas represent where more than 50% of population is increasing spending in tech area.
Follow the Money: The IT Investment Profile

**Capital investment remains strong**

![Chart showing capital investment over the years](chart.png)

- **2002**: 26% Capital, 74% Operational
- **2003**: 25% Capital, 75% Operational
- **2004**: 35% Capital, 65% Operational
- **2005**: 32% Capital, 68% Operational

Represents organizations with greater than $1B annual revenue.
Follow the Money: IT Strategic Profile

Optimization efforts appear to be effective, allowing for reinvestment.
Follow the Money: IT Strategic Profile by Sector

IT Spending to Run, Grow, & Transform the Business

IT Spending on Core Business Processes (Cross Industry)

- R&D: 11%
- Sales, Marketing, & Customer Support: 9%
- Operations: 28%
- Customer Service: 13%
- Marketing: 7%
- Retail: 14%
- Sales Support: 10%
- Other: 2%
- HR: 8%
- Production: 28%
- Finance: 12%
- Admin. Functions: 10%
- Inventory Management: 7%
Follow the Money: IT Spend by Tech Domain

Applications and infrastructure keeping steady

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>6%</td>
<td>3%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Finance and Administration</td>
<td>7%</td>
<td>5%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Application, Other</td>
<td>N/A</td>
<td>4%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Application Maintenance</td>
<td>16%</td>
<td>19%</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>Application Development</td>
<td>15%</td>
<td>20%</td>
<td>18%</td>
<td>15%</td>
</tr>
<tr>
<td>Help Desk</td>
<td>8%</td>
<td>5%</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Data Network</td>
<td>8%</td>
<td>8%</td>
<td>7%</td>
<td>11%</td>
</tr>
<tr>
<td>Voice Network</td>
<td>7%</td>
<td>6%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Desktop/LAN Server</td>
<td>16%</td>
<td>14%</td>
<td>11%</td>
<td>12%</td>
</tr>
<tr>
<td>Data Center</td>
<td>17%</td>
<td>16%</td>
<td>18%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Represents organizations with greater than $1B annual revenue.
Follow the Money: IT Spend by Category

Hardware & software investment increased, outsourcing stabilized

<table>
<thead>
<tr>
<th>Year</th>
<th>Hardware</th>
<th>Software</th>
<th>Outsourcing</th>
<th>Personnel</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>15%</td>
<td>42%</td>
<td>11%</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>2003</td>
<td>15%</td>
<td>37%</td>
<td>15%</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>2004</td>
<td>13%</td>
<td>36%</td>
<td>20%</td>
<td>16%</td>
<td>15%</td>
</tr>
<tr>
<td>2005</td>
<td>11%</td>
<td>33%</td>
<td>19%</td>
<td>19%</td>
<td>18%</td>
</tr>
<tr>
<td>2006</td>
<td>10%</td>
<td>34%</td>
<td>16%</td>
<td>20%</td>
<td>21%</td>
</tr>
</tbody>
</table>
Follow the Money: IT Outsourcing Spending

Organizations outsource more infrastructure activities

- Other: 1%
- Finance and Administration: 2%
- Application, Other: 5%
- Application Development: 13%
- Data Center: 13%
- Application Maintenance: 16%
- Desktop/LAN Server: 16%
- Voice Network: 19%
- Help Desk: 20%
- Data Network: 20%
Follow the Money: IT Spend Within the Business

IT is now a visible component of business process

Represent organizations with greater than $1B annual revenue.
The Market Basket Cost for IT infrastructure declined 58% between 1997 and 2004

Market Basket Index

Cost of 1 MIPS, 1 GB Mainframe Storage, 1GB Open Storage, 1 UNIX Server, 1 Intel Server, 1 Desktop, 1 Laptop, etc.
The primary driver of infrastructure cost increase is the increased demand for system resources and capacity resulting from rising system complexity supporting CRM, product variations, across-LOB customer views, and transaction spawning rates.
Follow the Phenomena: Business Based Infrastructure Sizing
Follow the Phenomena:
Infrastructure Size Footprint for a $6B Bank
Follow the Phenomena: MIPS and Net Revenue in Financial Services

- The correlations are astounding

![Mainframe Installed MIPS vs Revenue](image)

- $y = 0.6751x + 0.213$
- $R^2 = 0.9879$
Follow the Phenomena: Storage and Net Revenue in Financial Services

- The correlations are astounding

![GB Storage vs Revenue](image-url)

- \[ y = 17065x - 107250 \]
- \[ R^2 = 0.983 \]

- Storage (GB)
- Linear (Storage (GB))
Follow the Phenomena: IT Spending Trends 1994 to 2006 and Beyond

IT Spending as % of Revenue

Age of Irrational IT Exuberance

Age of Recovery, Growth and Integration

IT Spending Ice Age

Represents organizations with over $1B Revenue
New Views: The Evidence Is Misleading

- The roller coaster of IT spending is a manifestation of the distribution of the true technology spending in an enterprise “Total Technology Spend”
  - When IT spend is directed to decrease by business financial pressures, line of business technology spending increases
- Total Technology Spend is far greater than IT Spend
  - In Financial Services typically for every $1.00 of IT Spend there is $.30 to $.54 of LOB technology spending
  - In telecommunications, LOB technology spending is as high as 4x IT Spend
  - In media, LOB Technology spend is as high as 10x IT spend
- The distinction between IT spending and “technology spending” is a blur
- Governance and process might have more influence than the investment levels themselves
- The linkage between business performance may not be able to be assessed from the vantage point of IT alone
- Today’s benchmarking methods are inadequate
New Views for Analysis:
Total Technology Spend Vs IT Spend

- Using the benchmark group it is possible to create a top down view of Total Technology Spending in order to understand cost drivers and identify opportunities.

**Key Benchmark Indicators: Financial Relative IT Spending**

- InVestCo’s Total Tech Spend is at 10.63% of 2005 budgeted revenue which is close to the benchmark of 10.7%
- InVestCo’s IT Spend (which excludes the Direct IT Charges of Market Data (MDS) and “User Paid” expenses) is at 8.08% of 2005 budgeted revenue which is at 94% of the benchmark value.
- InVestCo’s Direct IT Charges for Market Data and User Paid expenses are disproportionately higher than in the benchmark group.

<table>
<thead>
<tr>
<th>Absolute Spending $M</th>
<th>Ratio of InVestCo to Benchmark</th>
<th>Spending as Percent of Revenue</th>
<th>Ratio of InVestCo to Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Tech Spend $</td>
<td>InVestCo 1,349.65 $</td>
<td>Group 2,200.00 $</td>
<td>Bmk 10.63%</td>
</tr>
<tr>
<td>IT Spend $</td>
<td>InVestCo 1,026.50 $</td>
<td>Group 1,760.00 $</td>
<td>Bmk 8.08%</td>
</tr>
<tr>
<td>IT Spend + MDS $</td>
<td>InVestCo 1,118.77 $</td>
<td>Group 1,897.00 $</td>
<td>Bmk 8.80%</td>
</tr>
<tr>
<td>IT Spend + User Paid $</td>
<td>InVestCo 1,257.38 $</td>
<td>Group 2,063.00 $</td>
<td>Bmk 9.90%</td>
</tr>
</tbody>
</table>
**Analysis:**
- 5 process variables were analyzed for each company.
- A sector average was determined by averaging each of the 5 process variables for all companies within a sector.
- Each quadrant’s sectors were grouped together and their process variables average was compared to the overall average for every sector.

**Process Variables:**
- **Sharing:** Relevant data captured in one business area is willingly shared across the company
- **Efficiency:** Cross functional and business opportunities are actively sought to improve service and reduce costs
- **Process Reengineering:** The redesign, simplification or reengineering of business processes always occur before money is spent on information systems
- **Repurpose:** Reuse of business processes and information systems components is maximized
- **Innovation:** Innovative use of IT in the business units is encouraged by the IT group even if company-wide standards are not always followed. Integration can be achieved later if successful

**New Views for Analysis:**
Governance and Process Variables Influence the Technology-Business Performance Linkage

Courtesy of Price Waterhouse Coopers and Maureen Maguire
New Views for Analysis: Governance and Process Variables Influence the Technology-Business Performance Linkage

Financial Services Organizations That Share Information Cross Functionally Drive Profitability More Than Any Other Sector

Sector Relationships Comparing Profitability and Process Variables

![Diagram showing sector relationships comparing profitability and process variables. The X-axis represents IT Spend as a % of Revenue (IT Dependency), while the Y-axis represents Operating Expenditures as a % of Revenue (Operating Intensity). Different sectors are represented with different symbols, and the size of the symbols indicates the level of IT dependency and operating intensity.]

Courtesy of Price Waterhouse Coopers and Maureen Maguire
Essentially, it is more important to know what it would cost a competitor to process your “book of business” than what your competitor is spending on its infrastructure. In this case on average $178M more!
New Views for Analysis: Building a Better Benchmark “Synthetically”

- Create a benchmark from the “piece parts” of companies with similar lines of business and weight appropriately for revenue and expense

<table>
<thead>
<tr>
<th>Company X</th>
<th>LOB 1</th>
<th>LOB 1A</th>
<th>LOB 1B</th>
<th>LOB 1C</th>
<th>LOB 2</th>
<th>LOB 3</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Revenue</td>
<td>$15,918</td>
<td>$3,959</td>
<td>$8,353</td>
<td>$3,606</td>
<td>$8,594</td>
<td>$1,229</td>
<td>$25,741</td>
</tr>
<tr>
<td>Non Interest Expense</td>
<td>$11,575</td>
<td>$2,879</td>
<td>$6,074</td>
<td>$2,622</td>
<td>$1,485</td>
<td>$1,049</td>
<td>$6,867</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competitor Benchmark</th>
<th>Expected Value</th>
<th>X Actual Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOB 1</td>
<td>LOB 1A</td>
<td>LOB 1B</td>
</tr>
<tr>
<td>IT Spend as % of Revenue</td>
<td>7.62%</td>
<td>11.76%</td>
</tr>
<tr>
<td>IT Spend as % of OpEx</td>
<td>10.56%</td>
<td>16.24%</td>
</tr>
<tr>
<td>Infrastructure as % of IT Spend</td>
<td>43.04%</td>
<td>43.99%</td>
</tr>
<tr>
<td>% of AD Spend on Development</td>
<td>53.19%</td>
<td>55.30%</td>
</tr>
<tr>
<td>% of AD Spend on Maintenance</td>
<td>46.81%</td>
<td>44.70%</td>
</tr>
<tr>
<td>% on Bus Inf as % of IT Spend</td>
<td>9.00%</td>
<td>9.00%</td>
</tr>
<tr>
<td>AD Spend</td>
<td>693</td>
<td>261</td>
</tr>
</tbody>
</table>
New Views for Research: The Topology of IT in the Business
New Views for Research:
IT and Shareholder Value

Technology Leadership Index
vs. DJIA, SP500
2003
Areas to Research

- The new pivotal issue is “managing technology as a business” – not just IT
- What is the relationship between business and technology sizing?
- Can there be just-in-time-IT
- Perhaps technology costs do not have to grow with business growth – can we invert the model
- The hidden IT inventory is growing – how should it be managed
- Technology innovation investment must be managed from “a room with a view”….. In the Run Grow Innovate model -- “I” must be protected
- Maybe there aren’t overall technology trends… maybe there are micro-climates with super-cells of innovation
- There has to be something next in the technology management and governance maturity model besides just making the CFO responsible
- Just looking at IT spend gives a false reading on business and technology – the total technology picture must be managed (back to “A room with a view”.. How can that be done?
- Is there really an isolated IT?
It is really all about:

- Opportunity and innovation
- Adaptation and responsiveness
- Sound economic models
- Enterprise balance, agility, resiliency
- Governance and process
- Delivery and architecture
- A Total Technology and Business View

It is not the strongest of the species that survives, nor the most intelligent, but the one that is most responsive to change

— Charles Darwin