

# Knowledge Capital Valuation



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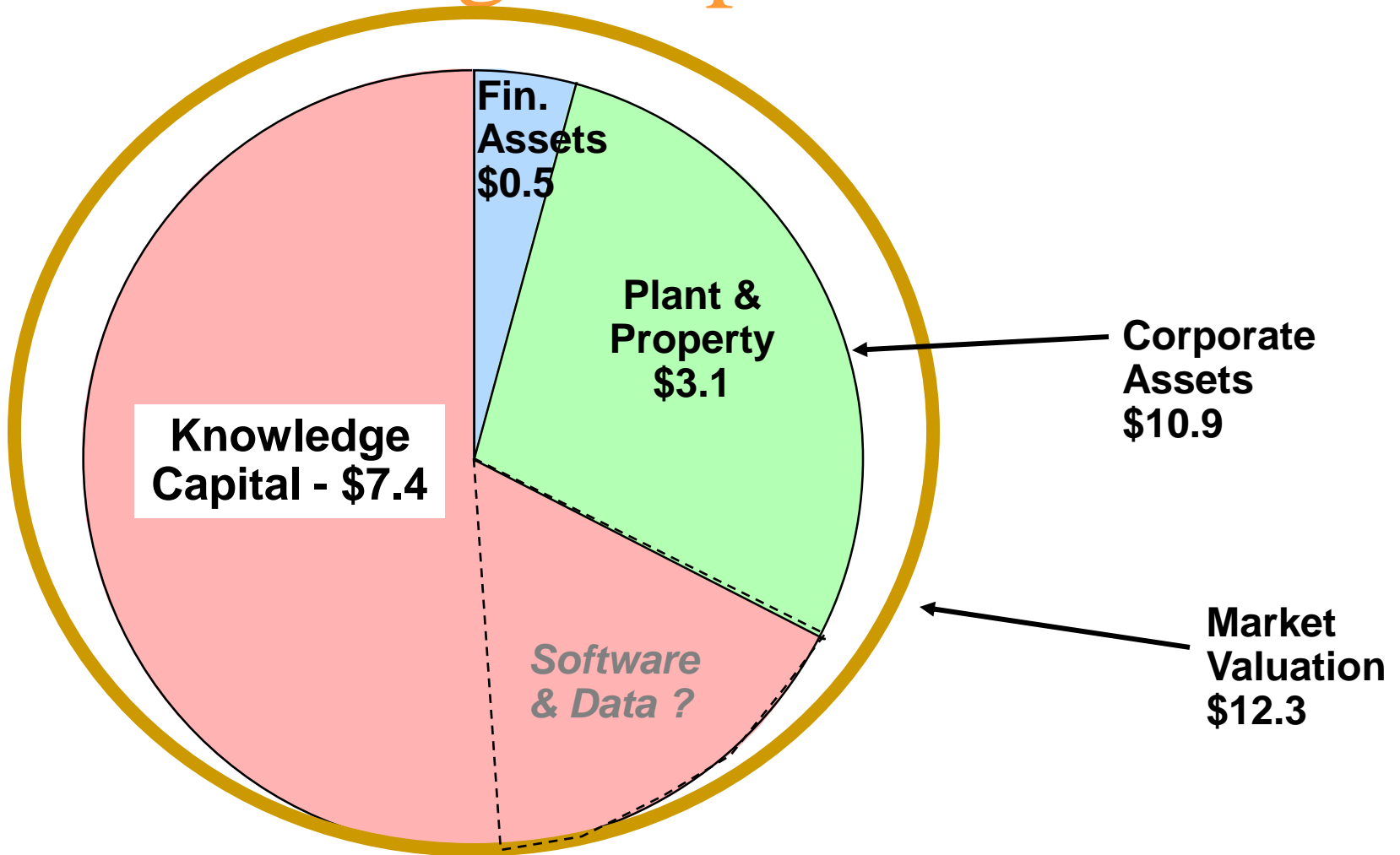
# Lord Kelvin, *Popular Lectures and Addresses, 1891-94*

**When you can measure what you are speaking about, and express it in numbers, you know something about it: but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science.**

# *We drown in information but crave for knowledge*

- **Human Capital: Competencies, Attitude ...**
- **Structural Capital**
  - **Policies, Procedures and Processes**
  - **Corporate Databases**
  - **Content**
  - **Intellectual Property: Patents, Licenses ...**
- **Customer Capital**
  - **Marketing, Sales and Delivery Channels**
  - **Customer Relationship**
  - **Partnerships and Alliances**

# Knowledge Capital in the US



SOURCE: Strassmann, Inc. database of 5,763 US firms, 1998 in US \$Trillions.

# Basics: ROI, NPV & IRR

- $ROI = (\text{Benefits} - \text{Costs}) / \text{Costs}$
- **NPV** = *The equation for a three year NPV is:*  
*(net benefit year 1 / (1+discount rate) + net benefit year 2 / (1+discount rate)^2 + net benefit year 3 / (1+discount rate)^3) - initial costs ... Discounted Cash Flow Model*
- **IRR** →  $NPV = 0$  e.g. 3-year model:  
*initial costs = net benefit year 1 / (1+IRR) + net benefit year 2 / (1+IRR)^2 + net benefit year 3 / (1+IRR)^3*

# Key Equations for EVA

**Economic Value-Added (EVA) =**

**Accounting Profit – Cost of Shareholder Capital**

**Cost of Shareholder Capital =**

**Cost of Capital \* Shareholder Equity**

**Cost of Capital = Risk-Free Interest + Beta\*Risk Premium**

# Information Productivity (EVA/Information Mgmt)

$$\text{Information Productivity} = \frac{\text{Output}}{\text{Input}}$$

$$\text{Info. Productivity} = \frac{\text{Information Value}}{\text{Cost of Information}}$$

$$\text{EVA} = \text{Information Value}$$

# Calculate Information Productivity

| Company Name - All data in 1999 \$Millions | Net Income | Cost of Capital - % | Net Financial Capital Employed | Costs of Information Management | Information Productivity |
|--|------------|---------------------|--------------------------------|---------------------------------|--------------------------|
| MERCK & CO                                 | \$5,891    | 8.536               | \$13,242                       | \$7,268                         | 65.5%                    |
| ABBOTT LABORATORIES                        | \$2,446    | 8.08                | \$7,428                        | \$4,035                         | 45.7%                    |
| BRISTOL MYERS SQUIBB                       | \$4,167    | 8.044               | \$8,645                        | \$8,830                         | 39.3%                    |
| SCHERING-PLOUGH                            | \$2,110    | 8.842               | \$5,165                        | \$4,625                         | 35.7%                    |
| PFIZER INC                                 | \$3,179    | 8.284               | \$8,887                        | \$9,127                         | 26.8%                    |
| JOHNSON & JOHNSON                          | \$4,167    | 8.338               | \$16,213                       | \$13,103                        | 21.5%                    |
| AMERICAN HOME PRODUCTS                     | \$-1,227   | 7.492               | \$6,215                        | \$6,780                         | -25.0%                   |



# How to Calculate Public Sector Information Productivity

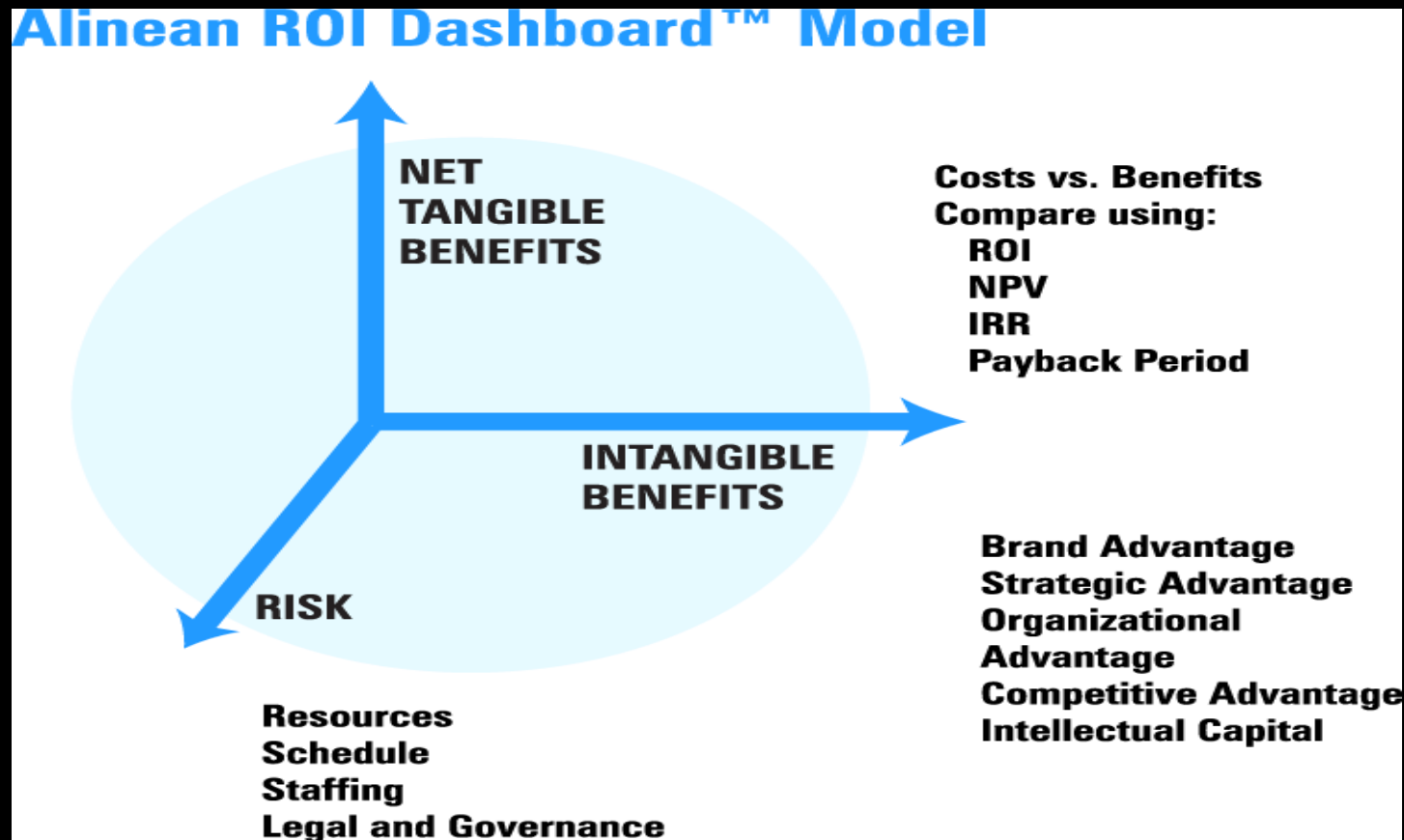
$$\text{Information Productivity} = \frac{\text{Service Delivery Costs}}{\text{Management Costs}}$$

Information Productivity of the New York City Board of Education:\*

$$\text{Information Productivity} = \frac{\$ 1,972}{\$ 4,135} = 48\%$$

\* SOURCE: Strassmann, P.A., The Business Value of Computers, 1990, p.91. In annual Costs per pupil, 1988-1989.

# Alinean – Strassmann ROI Model



# ValueIT™ - The CIO Survival Kit

Macro

## IT Value Chain Management

Competitive Peer Comparison

| Investments - in Millions        | No of Projects | Total User Spending | I.T. Budget | Average ROI |
|----------------------------------|----------------|---------------------|-------------|-------------|
| I.T. Cost Reductions             | 18             | 4.2                 | 4.2         | 181%        |
| Operating Effectiveness          | 22             | 7.2                 | 4.8         | 88%         |
| Strategic Gains                  | 4              | 18.7                | 9.2         | 240%        |
| Total Investments                |                | 30.1                | 18.2        | 186%        |
| Ongoing Maintenance & Operations |                | 0                   | 25.6        |             |
| Corporate Totals                 |                | 30.1                | 43.8        |             |

| in Millions                     |            |
|---------------------------------|------------|
| Sales                           | 1,873      |
| Costs of Goods Sold             | 928        |
| Sales, General & Administrative | 446        |
| Depreciation                    | 149        |
| Other                           | 37         |
| <b>Pretax Income</b>            | <b>419</b> |
| Shareholder Equity              | 4,658      |

Income Statement Impact  
Balance Sheet Impact  
KPI Improvements

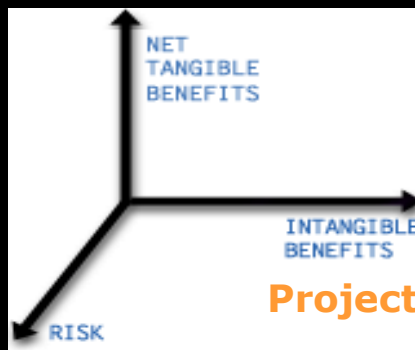
Shareholders  
Customers  
Supply Chain

IT Budget Proposal  
Project Selection

CXO and Directors

Stakeholders

Business Impact



Micro

Project Manager  
Business Unit Mgrs

Internal

External

# Crisis in Company Valuation

- **Book Value Accounting** still based on Luca Pacioli's 1494 *Summa de Arithmetica, Geometrica, Proportioni et Proportionalita* treatise on double-entry bookkeeping also known as the *Italian Method*.
- **Inability to account for Intangibles** later known as **Knowledge Capital** recognized since 1970s as a major problem.
- **Goodwill** introduced as an accounting fudge to explain why you paid too much. Goodwill is amortized whilst **Knowledge Capital** appreciates!

# Knowledge Valuation Methods

Knowledge Capital® Assessment

Market Value to Book Value

Tobin's  $Q$  Replacement Cost versus MV

Calculated Intangible Value

Baruch Lev's Knowledge Capital Valuation

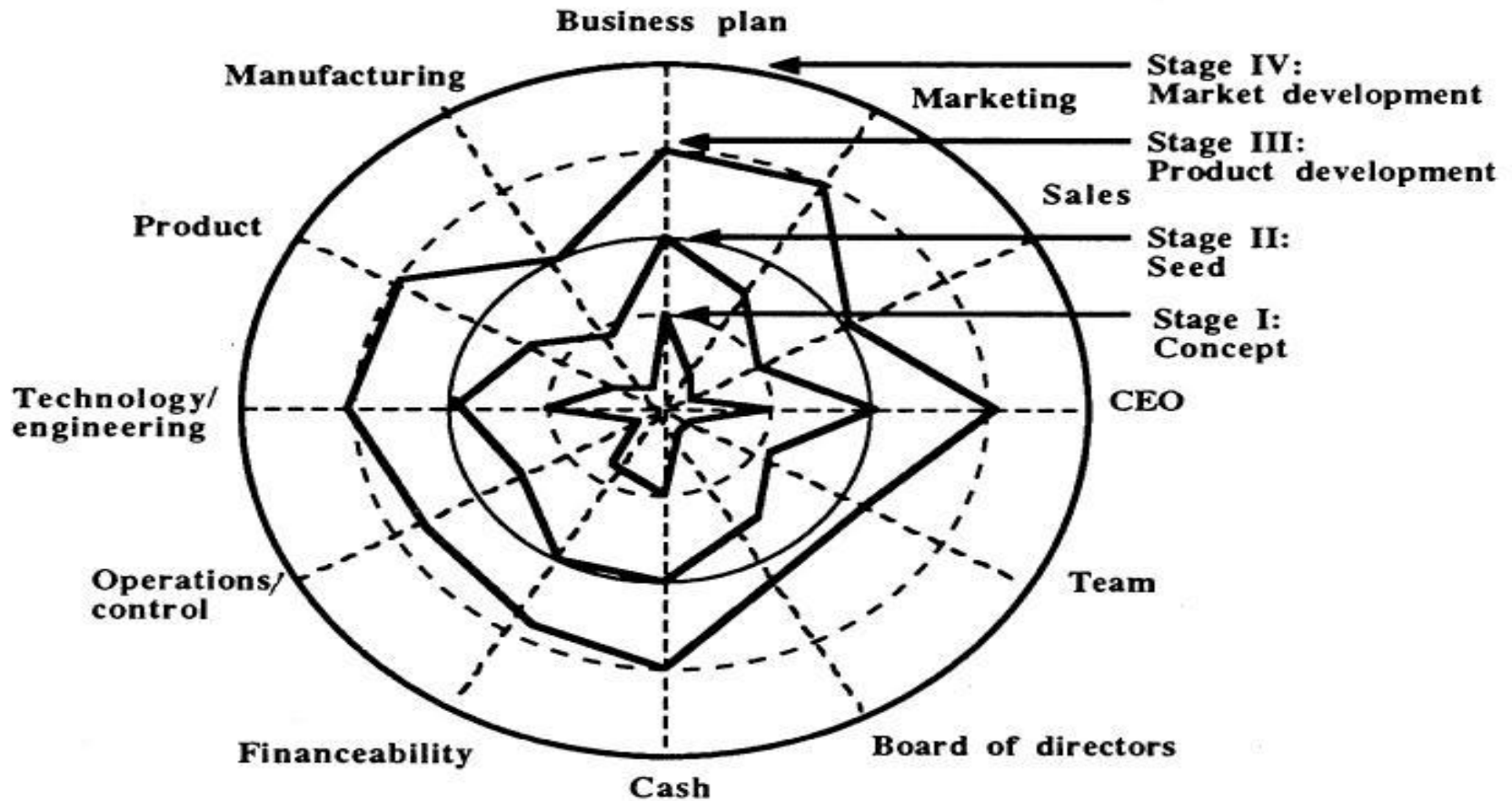
Scoreboard Valuation Techniques

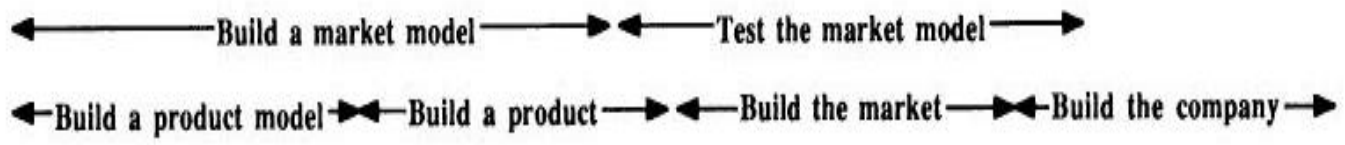
Livson's Valuation of Startups

# Knowledge Capital Views

- **\$People**                      **Brand Advantage**
- **\$Process**                      **Strategic Advantage**
- **\$Content**                      **Organizational Advantage**
- **\$Brand**                      **Mapping of Intangibles**
- **\$Alliances**                      **Competitive Advantage**
- **\$Customers**                      **Risk Reduction**
- **\$IP**                      **Intellectual Property**

# Bell-Mason Dimensions and Stages





# Bell Mason Stages of Growth

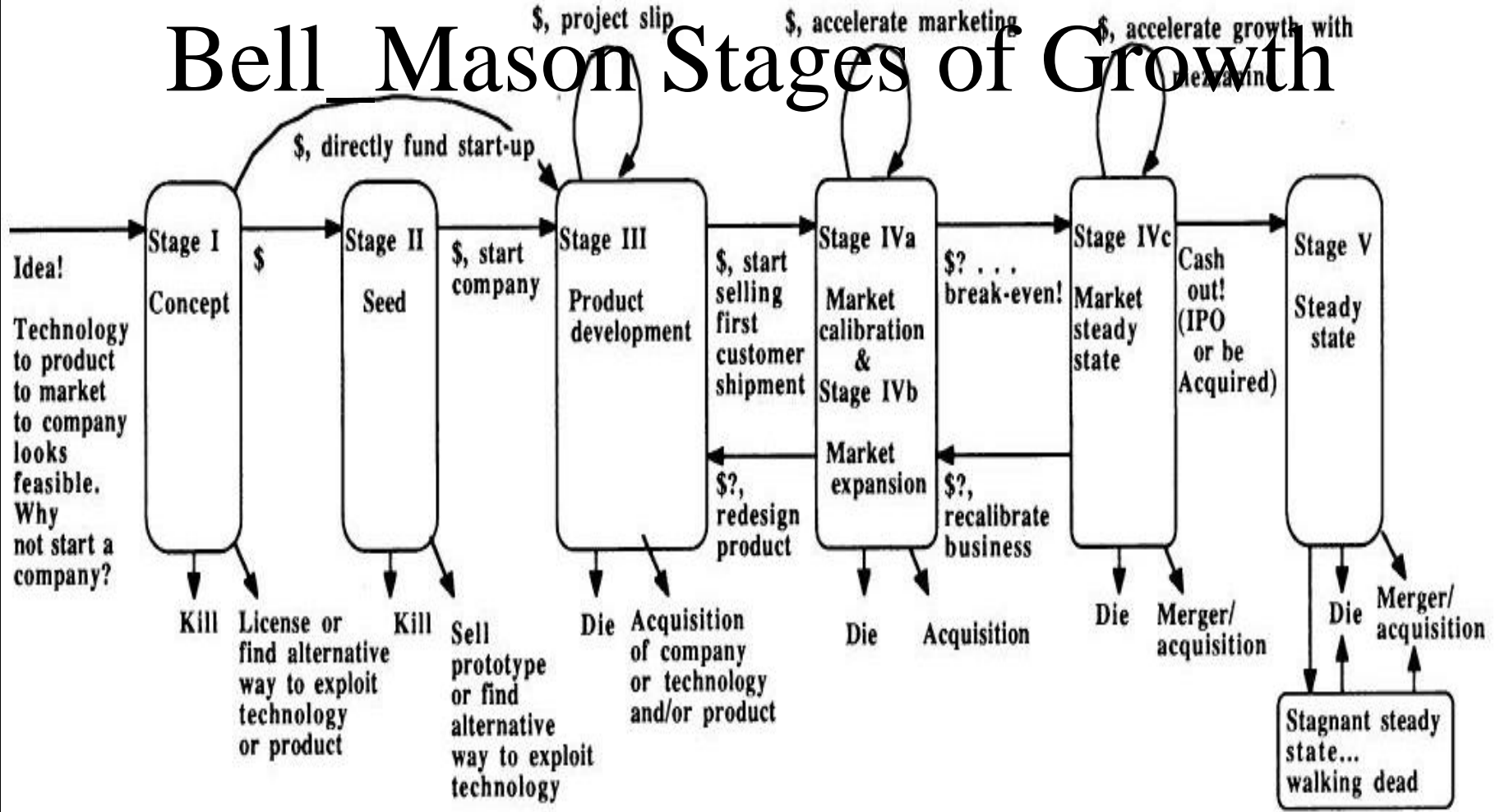


Figure 10-3. Flowchart of the Stages of Growth for a Start-up, Including the Criteria for Moving Among the Stages.



# Baruch Lev's KC Valuation

- **Knowledge Capital** = (Normalized earnings - earnings from tangible and financial assets)/(Knowledge capital discount rate)
- **Strengths:** Valuation is forward looking. It has some predictive capability.
- **Weaknesses:** Requires more effort to apply.

# MV, Strassmann & Tobin

- **Intellectual Capital = Market Value  
(Price/Share x # of shares) - Book Value  
(Equity - Debt)**
- **Strassmann's Knowledge Capital = (Profits -  
Financial Capital "Rental")/(interest rate cost  
of long term debt)**
- **Tobin's Q = Market Value/Replacement Cost**

# Calculated Intangible Value

- **Calculate average pre-tax earnings for three years**  
**Calculate average year-end tangible assets for 3 years**  
**Divide earnings by assets --> company average ROA for 3 years**  
**Find industry average ROA**  
**Multiply industry ROA by company's tangible assets.**  
**Subtract product from company's pre-tax earnings. --> Excess return.**  
**Calculate 3 year average tax rate. Multiply by excess return**  
**Subtract from excess return --> premium attributable to intangible assets.**  
**Calculate Net Present Value of Premium. Divide premium by discount rate. (i.e., cost of capital)**

# Ben Livson's KC Equation

- **MC=Market Capital, KC=Knowledge Capital, BV=Book Value & CV=Comprehensive Value and PV=Perception Value in market perception**
- **$CV=BV+KC$**
- **$MC=CV+PV=BV+KC+PV$**
- **Nokia 2000:  $MC=\$160b=\$6b+\$94b+\$60b$**
- **High PV=>Overvalued; Low PV => Undervalued**
- **Best Stock: Low PV and High KC !**