

# Timing Your Business Case with the Technology Valuation Lifecycle

By Ross Mayfield<sup>1</sup>

*Buyers and Sellers of technology have renewed their focus on valuation metrics such as Return on Investment (ROI), Total Cost of Ownership (TCO) and Return on Assets (ROA). There has been a marked shift from using ROI to TCO for the bulk of technology companies. Today's focus on cost cutting, however, only explains part of this shift. Customers demand business cases using different metrics at different times depending upon their aversion to technology risk and the business cycle. This article introduces a new framework, the Technology Valuation Lifecycle, for understanding when and why valuation metrics should be applied. The 5 Value Drivers for ROI, the Whole Cost Model for TCO and the Competitive/Capacity Advantage for ROA reveal key considerations for metric inputs. The article also highlights key business cycle considerations for valuation metrics and the drawbacks of metrics in developing a business case of technology purchase.*

Today's "realist" economy value is more important than ever. Fortune 1000 companies continue to delay incremental investments in technology and human capital in pursuit of lean operations. Purchasing approval has shifted from the CIO or business unit leader to the CFO. Current lore demands that if a purchase or project is not one of the top three priorities as ranked by a valuation metric (ROI, TCO, ROA, etc.) and strategic importance, it's dead in the water.

Most recently, there has been a significant shift from using ROI to TCO to justify technology purchasing. TCO has been around for a long time as an internal metric, but less so for technology procurement. Although the economy has squarely put a focus on cost, this alone fails to explain the shift. Taken together, the Technology Adoption Lifecycle and the business cycle provide a better understanding for what valuation metric should support a business case at what time.

Valuation metrics and methodologies play an important role in benchmarking and forecasting the economic value a technology product or project could generate. However, valuation methods are only useful if applied to the right problem with the right data. A February 2001 survey<sup>2</sup> by CIO Magazine found that 86% found measuring IT value an important or extremely important priority, while only 10% feel that value measures are very or completely reliable. 41% use ROI, 29% use TCO, 14% use IRR, and 8.2% use ROA.

Three primary valuation metrics should be considered to support a business case at different times: ROI, TCO and ROA. IIR can be considered a subset of ROI. What differs with these three metrics is how they *contextualize* the investment to assess technology risk. ROI calculates the expected financial return, discounted for the risk of achieving the return, of deploying IT relative to the direct costs of the technology and its deployment. TCO contextualizes the benefits within the cost of the technology within business operations by assessing the direct and indirect costs that create operational expenses. ROA contextualizes the benefits within the asset base of the company, or capital expenses.

The Technology Adoption Lifecycle provides an adaptable and commonly understood framework for considering the timing of business cases. All companies exist within this probability

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<sup>2</sup> CIO Research Reports, *Measuring IT Value*, <http://www2.cio.com/research/surveyreport.cfm?id=16>

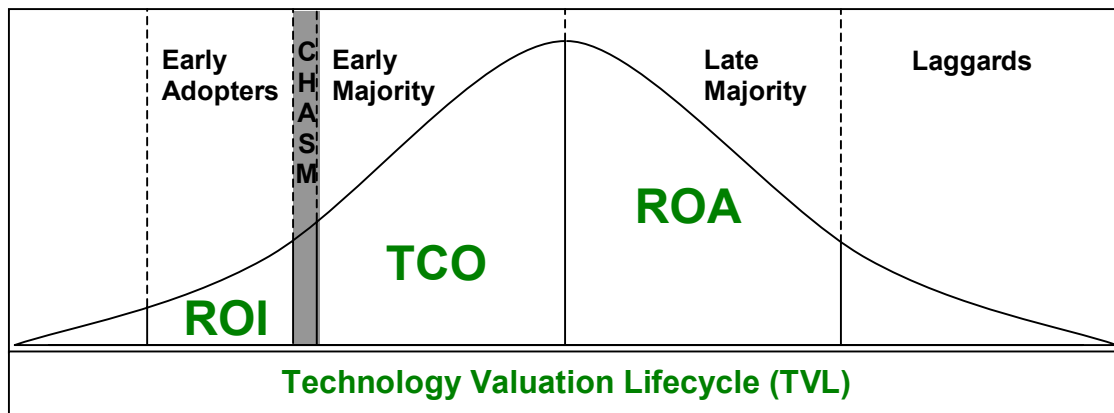
distribution, with their segments defined as standard deviations from the mean. Each segment represents a psychodemographic profile of a technology prospect. Each segment (Innovators, Early Adopters, Early Majority, Late Majority, and Laggards), from left to right, has:

- A decreasing tolerance for technology risk,
- A decreasing investment in indirect costs, such as learning costs/skills of employees, and
- A decreasing strategic advantage and financial reward.

For example, Early Adopters are willing to risk investment to learn new technologies, even when the technology is largely unproven. The Late Majority, by contrast, is unwilling to invest in learning and demands market proven technologies.

### Technology Valuation Lifecycle

Different companies comprising small industry groups that share similar buying characteristics within market segments are more prone to using different metrics to build a business case for technology investment because they hold different tolerances for risk. The Technology Adoption Lifecycle (TAL) maps to a Technology Valuation Lifecycle (TVL):



1. **Innovators** do not purchase technology on the basis of an economic business case and rarely would take advantage of any metric. They are also individuals who rarely need to make a business case to others in an organization for such projects.
2. **Early Adopters**, or Visionaries, acquire technology as a change agent, for competitive differentiation. ROI is a sufficient measure for this objective, because the project is usually focused on creating new strategic advantages outside the focus of core operations. ROI is effective for determining the utility value of a differentiated new technology that does not have direct competition. Visionaries are risk tolerant in that they will invest time to learn new technologies and will accept ROI models based upon reasonable assumptions. Since the investment objective is as a change agent, the operational and capital expenditure costs for deployment are less of a risk factor than achieving basic competitive advantage with basic returns on invested capital.
3. **Early Majority**, or Pragmatists, acquires technology for productivity improvements. TCO contextualizes benefits within the operations of the company, as measured by operating expenditures. TCO informs decisions on technologies of similar benefits. ROI is used to support the argument, but will not be the metric of focus. This segment is less risk tolerant than the aforementioned, and requires references to offset risks. This means that TCO models cannot be pure theory. They require actual case studies from comparable customers or deployments to stress test results. Their strong reference requirements may also require third party validation (e.g. from an Industry Analyst) of the model or cases. Since the investment objective is to improve productivity, the technology is deployed within the context of operations, putting greater focus on operational expenditures put at risk created by deployment.

4. **Late Majority**, or Conservatives, purchase technology to maintain competitive equivalence with the mainstream market by maximizing asset utilization. At this point in the lifecycle, technologies are well tested and proven their value. In addition, competitive pressures from competing providers reduce the price, as these once hot technologies have become commodities. ROA contextualizes benefits within the asset base of the company. ROI and TCO are used to support the business case, but are not the metric of focus. This segment is even less risk-tolerant and will not invest to learn how to use technologies. Since the investment objective is maximizing asset utilization, the focus is on the price and price risk of the commodity.
5. **Laggards** purchase technology, if at all, when it is deeply embedded in other products and do not factor valuation of the technology into a purchasing decision.

As a framework, the Technology Valuation Lifecycle provides a customer-driven determination of the metric of focus. The metric of focus is the primary basis for the economic buying decision, but it is not the only metric. The Early Majority will focus on the productivity impacts measured by TCO, but will also confirm competitive advantage gained as measured by ROI. The Late Majority will focus on maximizing asset utilization, but will also confirm competitive advantage as measured by ROI and productivity improvement as measured by TCO.

The next three sections will highlight the primary inputs for valuation metrics. It will introduce the 5 Value Drivers for ROI, the Whole Cost Model for TCO and the Competitive and Capacity Advantage for ROA.

#### **SIDEBAR: BEA Systems – Winning the Metric Wars**

As the economy softened, BEA System's market leading Weblogic Application Server faced increased competition from major new entrants such as IBM, Sun, HP, Oracle and Sybase. Adoption of Java's J2EE framework created significant utility and reduced risk from standardization, but also lowered barriers to entry. Open source App Servers from Apache and JBoss further accelerated the trend towards commoditization.

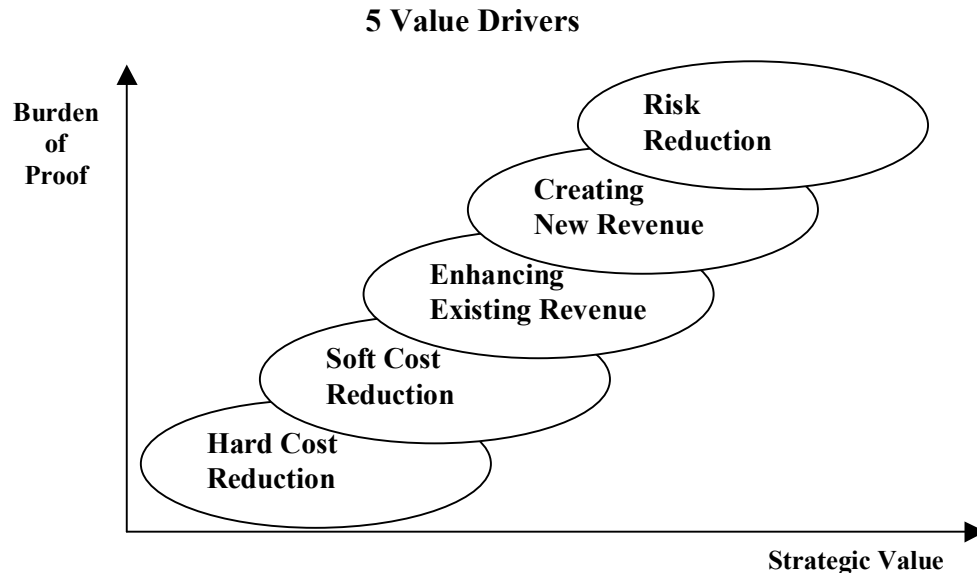
The valuation metric BEA had used to sell its highly differentiated Weblogic platform was ROI. It was and is their primary source of revenue. The most significant challenge came from IBM, which developed a standards-based product, engaged in significant price discounting and bundling. IBM sold on the basis that both products had equal benefits – but IBM offered a price advantage. Initial success of this strategy provoked many Industry Analysts to predict BEA would be a casualty of commoditization.

BEA crossed the metric chasm to TCO. According to BEA marketing executive (name withheld) "we recognized that our differentiation was value in use. Because of the bubble, many customers were disregarding ROI estimates. When we are faced with a side-by-side comparison, the important metric isn't the cost of the server itself, but how the server creates productivity benefits for its users, which is best measured by Total Cost of Ownership."

Combined with moves to emphasize the quality of its product, BEA has so far successfully staved off commodity competition and retained its market share.

## ROI – The 5 Value Drivers

ROI is a measure of potential financial value created relative to investment and risk. Technology has 5 Value Drivers, or ways it creates financial value: decreasing hard costs (capital expenditures), decreasing soft costs (operational expenses), increasing existing revenue streams, creating new revenue streams and reducing risk (decreasing the variability of outcomes).



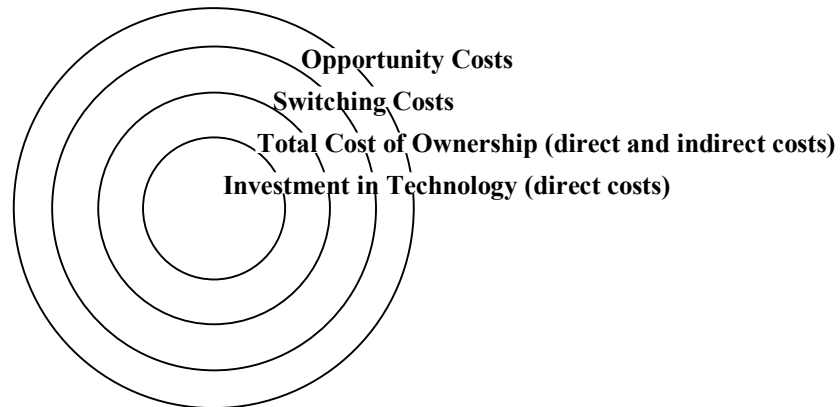
When the business cycle is at its bottom, as it is today, the burden of proof increases and the strategic value decreases. When times are good, as they will be again, the decreased cost of capital eases the burden of proof and increasing market opportunities enhance the strategic value of technology.

## TCO – The Whole Cost Model

TCO is a model for assessing the direct and indirect costs of technology deployed in an operational context. TCO goes beyond ROI, which only includes direct costs (the investment), to include indirect cost. In assessing indirect costs, there are two traditional methods, Traditional Cost Accounting and Activity-Based Costing. Traditional Cost Accounting adds direct costs to indirect costs estimated by an overhead amount that is arbitrarily allocated according to a volume-based measure (e.g. employee hours deploying and using the technology). This top-down method assumes a relation between the overhead amount and the volume-based measure. Activity-Based Costing develops a bottom-up estimate of indirect costs based on specific categorized activities created by the technology. TCO is an Activity-Based Costing method to reveal a more accurate estimate of overhead.

However, direct and indirect costs are not the only costs that need to be considered when purchasing technology. The below Whole Cost Model reveals the difference between “total and whole”:

## Whole Cost Model



Switching Costs are costs incurred when a purchased technology is replaced with new one. When buying a technology, switching costs should be considered if it is replacing an old technology. Buyers also need to consider potential switching costs the current technology creates for future purchases. Sellers have the incentive to raise switching costs for future purchases to lock-in customers and raise barriers to entry for competitors.

Recently businesses have emphasized “agility,” or the ability to adapt to a rapidly changing environment, as a strategic imperative. Being agile means having options you can exercise at less cost. When comparing technologies, Buyers should consider if a technology creates or limits options. When an option is not created by a technology, such as having open Application Programming Interfaces, the Opportunity Cost of not being able to integrate the application with others should be considered.

Perhaps just as important to gaining a complete picture of cost is having an equal assessment of benefits. If an Early Majority Buyer uses a TCO methodology to contextualize the investment within operations, it is only fair to ease the burden of proof for reduction of Soft Costs for inclusion in ROI estimates.

It is also reasonable that Early Majority Buyers should be flexible to considering intangible benefits. MIT’s Eric Brynjolfsson and others<sup>3</sup> recently studied the interaction of information technology and human capital to reveal that the intangible benefits of workplace organization in conjunction with technology deployment may exceed productivity benefits from the technology itself. In other words, technology deployment is an organizing principle that improves employee productivity. Predicting changes in human behavior and resulting human capital productivity is an important qualitative exercise for any project, but is not a factor for the simplified models of technology valuation metrics. However, technologies at the Early Majority stage of development that are deployed in the operational context, should give significant consideration to human capital intangible values alongside their TCO valuation.

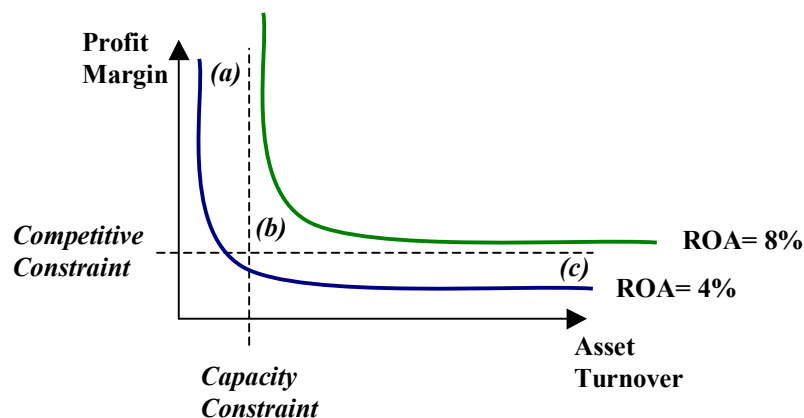
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<sup>3</sup> Timothy F. Bresnahan, Erik Brynjolfsson, and Lorin M. Hitt, (February 2002) "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence". *Quarterly Journal of Economics*, Vol. 117 pp. 339-376. [[Click here for the Working Paper version](#)][[Click here for the abstract](#)]

## ROA – The Competitive/Capacity Advantage

Technologies that maximize the asset base of a company do so by reducing both competitive and capacity constraints. Competitive constraints impact the profit margin of the company. Capacity constraints impact the total asset turnover (net sales divided by average total net assets). ROA is a measure of profit margin and total asset turnover.

### The Competitive/Capacity Advantage



However, the particular combination of profit margin and asset turnover differs by industry and management strategy.<sup>4</sup> Capital-intensive industries (e.g. steel, auto, heavy manufacturing) by nature have a low asset turnover and must seek higher profit margins. Commodity-like industries (e.g. retail food, paper, industrial chemicals) face greater price competition and must compete on the basis of a higher asset turnover. Companies in the lower right section of the graph (c) will seek technologies that improve the efficiency of their asset base (e.g. factory planning and execution software that reduces capacity constraints). Companies in the upper left section of the graph (a) will seek technologies that improve profitability (e.g. enterprise profit optimization software that reduces competitive constraints). Companies in the middle segment (b) have a more balanced position for which technologies will impact their Return on Assets.

The objective for any technology company selling to the Late Majority is to improve the ROA of their customers by removing competitive and/or capacity constraints. They do so by developing and positioning technology with superior ROA itself. Understanding the relative benefits of competitive or capacity advantage that impact ROA is essential for building a business case. Understanding these advantages is even more essential to technology companies because they themselves face significant price competition. And combating price pressure with well positioned value wins price wars.

### Metric of Focus

Choosing a metric of focus for a technology has significant implications:

- *Buyers* need to align their valuation metric with shareholder expectations and operations. For example, if a discrete manufacturer plans an investment in an optimization system for their production floor to maximize their asset base, full accounting for indirect costs and communication of value in terms of ROA. Buyers are also more prone to institutionalize

<sup>4</sup> Tomas Selling and Clyde P. Stickney, “The Effects of Business Environment and Strategy on a Firm’s Rate of Return on Assets,” *Financial Analysts Journal* 45, no. 1 (January-February 1989): 43-52. Provides a firm-level analysis of the use of ROA, adapted for technology procurement for this article.

their metric of preference and apply it regardless of where on the Technology Valuation Lifecycle the technology resides. Buyers must be willing to change metrics depending upon the business case and also to assure they are comparing apples to apples (especially in comparing the value of a new project to previous experiences)

- *Sellers* need to align the valuation metric with their business model and product marketing. For example, if a software company finds its target market segment to be the Early Majority an Application Service Provider (ASP) business model would further reduce TCO. Pricing must not only be justified by the value of the product, but support a sustainable business model.
- *System Integrators* face a unique challenge of bundling products originally built and promoted towards different valuation metrics and a need to contextualize the whole value concept for their customer.
- *Venture Capitalists* have traditionally used ROI to define the value proposition of early stage companies. Despite the temptation to shift to TCO in a cost-constrained environment, if the technology is highly differentiated ROI is a better measure to gauge potential value. By the time an early stage company is crossing the chasm, they will have fulfilled a whole product concept through development and partnerships that reduces indirect costs, a more reasonable time to apply TCO.

### **Business Cycle Considerations**

The most basic calibration to valuation models that is made according to the business cycle is the discount rate. However, using a discount rate to account for risk of return to future cash flows is only as good as the assessment of risk and the inputs of cost and benefit they are based upon. Different inputs used in different environmental conditions:

- *Hard vs. Soft Costs*: today's bottom line economy puts a greater emphasis on hard cost savings vs. soft cost savings. It is important to understand that this change is because, in part, valuations of publicly traded companies are less frequently based upon EBITDA and more frequently based upon Net Income, which accounts for hard costs. When the economy is booming, public company valuations shift to the top line to reward gaining a greater share of a growing pie. Top line valuation also allows unprofitable companies who emerged to capitalize upon new opportunities to be valued at all.
- *New vs. Old*: when the business cycle is at its bottom, increasing existing revenue streams rather than creating new revenue streams is less risky and given better credence for inclusion in valuation models.
- *Tangible vs. Intangible*: technology benefits measured by the model will shift from a focus on tangible values in a down economy to marginal inclusion of intangible values (e.g. human capital, intellectual capital).

Since business cases are aligned with business models, it is natural to translate business cases into shareholder value. The Information Economy bubble put a premium on equity value and purchasers of technology demanded business cases relate to equity value. While co-founding and taking public RateXchange, the leading B2B exchange for the telecom industry, we had a highly differentiated solution with a compelling ROI. Our bandwidth trading solution created value primarily from reduction of Sales, General and Administrative costs. However, this value proposition needed to translate to the strategic level. Listening to our customers, we developed a well-received whitepaper that not only defined hard and soft cost savings, but also implied how a reduction in S, G & A could impact shareholder value as measured by EBITDA.

## **SIDEBAR: Valuation Shifts**

The turn of the century was filled with optimism for the impact of technology to disrupt industries and topple large vertically integrated companies. Fear of obsolescence drove many companies to adopt technologies that were too immature for their culture and operations. A *psychodemographic shift* occurred in which Pragmatists became Visionaries and Conservatives became Pragmatists. Technology purchasing occurred under the wrong metrics. Pragmatists acting as Visionaries attempted to acquire productivity technologies under ROI, without consideration of risks and costs of operational deployment under a TCO model. Conservative asset-based companies lost the discipline of commodity procurement and bought technologies at a premium without consideration of how rapidly they would depreciate in value.

Today, in over-reaction to the bubble, the opposite has occurred typified by Silicon Valley's shift from ROI to TCO. Innovators are building business cases. Visionaries are attempting to become Pragmatic, and judging change agent technologies not for their potential strategic impact but for their operational effectiveness. Pragmatists are purchasing proven commodities that provide plug and play benefits. Conservatives, well, aren't purchasing much of anything.

## **Metric Limitations**

Valuation metrics are a trade-off between simplicity for ease of use and comparison and complexity of determining which inputs are credible factors. The most valuable aspect of a valuation metric isn't the output, but the process of metric selection, study of inputs and assumptions, and the assessment of risk. Ideally this process occurs with all stakeholders (e.g. the buyer and seller) to develop a shared understanding of risk and reward.

Additionally, there is one major drawback to these valuation metrics: how they account for the non-linear nature of technology deployment.

Technology investment and deployment is, by nature, non-linear. NPV-based metrics such as ROI and ROA assume a linear project state with little uncertainty in which there are no milestones that allow new decisions. In reality, investment can be incremental and milestones produce new information to assess risk and opportunity. Real Options Valuation (ROV) theory provides a mechanism to value alternative branches of a decision tree by valuing each decision as an option. However, the complexity of this approach and the financial acumen required has not yielded significant adoption. For the Late Majority, their asset-based business models and focus on the efficiencies of commoditization compels them to consider this approach. Alongside ROA, ROV provides a more complete picture of the risks and opportunities of a technology initiative over time.

## **Conclusion**

At the company level, the Technology Valuation Lifecycle is a framework for determining the appropriate metric for a technology purchase or project for a given company based upon their perception of technology risk. When estimating ROI, companies should consider the 5 Value Drivers. When estimating TCO, companies should consider the Whole Cost Model. When estimating ROA, companies should consider the Competitive/Capacity Advantage. The Technology Valuation Lifecycle is also a useful lens to view the larger shifts in attitude towards technology's benefits in the economy.