

Measuring the Business Value of Information Technology

Practical Strategies for IT and Business
Managers

David S. Sward

Intel
PRESS

Copyright © 2006 Intel Corporation. All rights reserved.

ISBN 0-9764832-7-0

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4744. Requests to the Publisher for permission should be addressed to the Publisher, Intel Press, Intel Corporation, 2111 NE 25th Avenue, JF3-330, Hillsboro, OR 97124-5961. E-mail: intelpress@intel.com.

This publication is designed to provide accurate and authoritative information in regard to the subject matter covered. It is sold with the understanding that the publisher is not engaged in professional services. If professional advice or other expert assistance is required, the services of a competent professional person should be sought.

Intel Corporation may have patents or pending patent applications, trademarks, copyrights, or other intellectual property rights that relate to the presented subject matter. The furnishing of documents and other materials and information does not provide any license, express or implied, by estoppel or otherwise, to any such patents, trademarks, copyrights, or other intellectual property rights.

Intel may make changes to specifications, product descriptions, and plans at any time, without notice.

Fictitious names of companies, products, people, characters, and/or data mentioned herein are not intended to represent any real individual, company, product, or event. Intel products are not intended for use in medical, life saving, life sustaining, critical control or safety systems, or in nuclear facility applications.

Intel, the Intel logo, Celeron, Intel Centrino, Intel NetBurst, Intel Xeon, Itanium, Pentium, MMX, and VTune are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

†Other names and brands may be claimed as the property of others.

This book is printed on acid-free paper. ©

Publisher: Richard Bowles

Managing Editor: David King, PhoebusGroup, LLP

Program Manager: Stuart Douglas, Douglas Technology Group

Text Design & Composition: PhoebusGroup, LLP

Graphic Art: Rick Eberly

Library of Congress Cataloging in Publication Data:

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

First printing: June 2006

Chapter 1

Introduction

If you can't measure IT, you can't manage IT.

—Modified from Andy Grove, Chairman Emeritus, Intel Corporation

Organizations large and small face the same dilemma: scarce resources. Choosing and deploying the right solution to maximize an organization's performance, to satisfy customers, and to make and maintain a profit has never been more critical. Information technology, in particular, often loses its significance as a major contributing success factor in an organization's strategic objectives because it is predominantly considered a function within an organization that is not integral to achieving business objectives. Consequently, budgets are squeezed year after year as IT organizations inevitably drift towards the "cost center" perception, and not toward being the competitive differentiator that IT has the potential to be.

As a Human Factors Engineer (HFE) and someone who has worked in the IT industry for many years, I consider this a myopic and potentially dangerous notion for any organization. It is critical for IT organizations to alter their thinking and identify not only the cost, but the value that IT brings to the enterprise. How can this be done? Measure the bottom-line impact of information technology to reveal its true value and enable allocation of resources in the most essential areas.

Human Factors Engineering

Human Factors Engineering is an applied discipline that seeks to optimize human interaction and safe operation with technology by applying what is known about human capabilities and limitations to the design, use, maintenance, and removal of both simple and complex systems.

In an earlier era, some of this work was the domain of industrial engineers leading time-and-motion studies on the assembly line. However, most office environments and the work processes performed in those environments, do not easily lend themselves to traditional time-and-motion measurement. HFE professionals fill an important role with their specialized training in the subtleties of the knowledge workplace.

Audiences For This Book

I wrote this book with several audiences in mind.

- Project managers who have a potential IT solution in mind that will benefit their organizations. Finance will not approve deployment without solid data demonstrating business value to the company. This book will provide project managers with ideas, methods, and examples of how to systematically collect data on the business value of the solution.
- Managers of IT organizations who want to determine the best way to maximize the value delivered to their company, defend their current budgets, and argue successfully for increased funding that will help grow the business. This book provides techniques for measuring business value for a portfolio of IT investments.
- Product managers at companies that develop and deliver IT solutions. The sales and marketing organization needs to develop objective and credible case studies on how the company's IT products and services impact the customer's bottom line. This book explains how to develop credible and empirically sound case studies demonstrating information technology's business value (ITBV).
- CEOs of companies who want to grow their businesses and who have asked all business units to develop alternatives, including the

IT department. This book provides rational and systematic ways to choose which investments in information technology impact the bottom line.

- Lecturers in MBA programs who want to illustrate the importance of informed business decision making for IT investments. In addition to explaining how to frame the conversation on informed decision making and ITBV, this book provides a business-school style case study to support classroom discussion.
- IT professionals who want to complement their technical skills with the ability to use metrics and methods to demonstrate the business value of their IT initiatives. This book provides IT professionals with better metrics that quantify the widespread soft benefits of IT and links those soft benefits to the enterprise bottom line.
- IT solution providers serving small and medium-size businesses (SMBs) where extensive financial and HFE analyses are usually unfeasible. For those who serve SMBs, this book provides examples that can serve as benchmarks supporting investment decisions or recommendations.

In today's fiercely competitive business climate, IT organizations face increasing pressure to prove the business value of information technology investments. Interest in the valuation process is widespread because ITBV affects the entire enterprise. Doing a credible job of measuring ITBV has never been an easy task.

IT Cost vs. IT Benefit

IT is often viewed as a cost center, and a result of this perspective is sustained focus on total cost of ownership (TCO). While this is an important and necessary approach to IT management, used in isolation it does nothing to demonstrate the impact IT has on the profitability of the company it supports. When a department is viewed solely as a cost center, budgets are squeezed year over year as competition continually erodes budgetary resources. As a result, it is difficult for IT organizations to enable the long-term competitive advantage senior management demands. Corporations operate in a complex mix of markets on a global

Customer, Stakeholder, and End-User

- The *customer* is the person or organization investing in the IT solution. Customer orientation vs. technology orientation indicates that IT is being run like a business.
- *Stakeholders* have a vested business interest in the IT solution, are not directly funding the project, and should be able to influence the project.
- *End users* are the individuals who use an IT solution to perform their work. These people press the keys, click the mouse, input information, and respond to output from the IT solution to accomplish business objectives.

It is critical to involve end-users and stakeholders in the development process to ensure that the IT solution satisfies their needs as well as the needs of the customer.

scale that is changing at ever-increasing speed. Users have never been so sophisticated or demanding with respect to the IT services they require in this highly competitive environment. This book explores one way IT can move from being perceived as a cost center to becoming a strategic partner that contributes to organizational objectives and enables a competitive advantage for the organization. To do this, the IT organization must change from being techno-centric to user-centric.

As shown in Figure 1.1, when user experience design (UED) brings together business objectives, user requirements, and IT capabilities, then the IT organization is in position to leverage these three inputs into a significantly large amount of measured business value. IT organizations that successfully bridge the gap between end-users and business objectives will create a competitive advantage with IT investments that impact the company's bottom line.

This book is about the processes and tools implemented within Intel and in other organizations that measure the business value of information technology. The ideas and methods that comprise Intel's ITBV program are heavily influenced by finance concepts and by the discipline of Human Factors Engineering, which is my primary discipline. HFE is the scientific discipline that develops and applies the principles of what is known about human capabilities and limitations to the design, use, maintenance, and removal of simple and complex systems.

I led an Intel HFE team that brought scientific rigor to a new ITBV program that measured and improved business value contributions

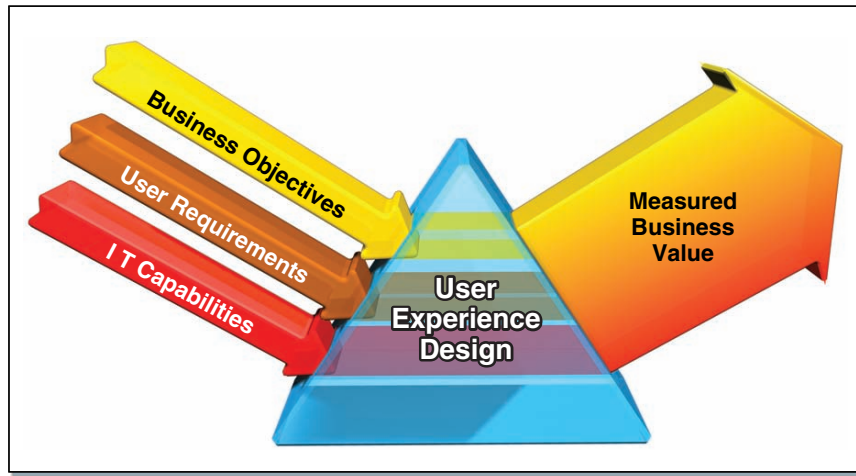


Figure 1.1 Driving Greater Business Value

driven by IT investments. HFE provided the right level of objectivity to a number of outcomes that are typically difficult to measure. Specifically, HFE provides an excellent way to measure IT impact on employee productivity. Individuals with formal training in HFE have a skill set that enables them to tackle many of the difficult issues around quantifying so-called *soft* benefits.

An Intel finance team was also at the nucleus of the ITBV program from the onset to ensure that proper financial methods were woven into the program. While we both clearly understand that other skill sets play a part in developing an ITBV program, it was representatives from finance and HFE that set the foundation for framing the overall structure and processes Intel used.

Combining finance, HFE, and other methods into a unified systematic approach is the key to success when defining, measuring, and tracking the business value of IT. Many methods discussed in this book are drawn from a variety of disciplines and are in use in many enterprises. Applying methods with successful track records to an ITBV program can only add to its overall quality.

Information Technology and Business Value Defined

Throughout the book, I define information technology as the products, services, or solutions that are deployed to store, retrieve, transport, or process information in the course of a business unit or end-user accom-

plishing a goal. While adding the aspect of a business unit or end-user to the definition goes beyond the typical definition, it is critical to understand that businesses deploy IT to assist employees in getting their jobs done.

An IT organization is any group, department, or division, either internal or external to the company, that is responsible for developing or deploying information technology to the users they support. These IT organizations may support an accounting firm, a parts manufacturer, an office supply store, an on-line retailer, a marketing group, or a high-tech company.

Business value is the benefit for business units and the enterprise as a whole, represented in dollar terms, that is a result of IT solutions or services, as evidenced by one or more of the following:

- Direct contribution to the corporation's market position or revenue
- Deliverables and results that support solving customer business needs and challenges
- Customer cost savings or financial benefits
- Examples of technology investment that advance the industry

Information Technology and Business Value

In the last 20 years there have been incredible changes in information technology. People work through Internet-connected high powered workstations, notebook computers with integrated wireless, servers, personal digital assistants (PDAs), pagers, and dozens of other smart devices. Continued advances in hardware and software are changing the speed and shape of how business gets done. While there is a general assumption that IT increases productivity, companies are increasingly demanding that IT investments demonstrate measurable results (Harvard Business School 1999).

The academic community has been divided for years on whether IT provides business value. In the 1980s, Robert Solow, professor at MIT Sloan, summarized his thinking by saying, "I see computers everywhere except in the productivity statistics."

In recent years, researchers have shown the connection between IT and productivity. Using a production function approach to compare business-value outputs (*i.e.*, revenue, stock price) with and inputs (*i.e.*, capitol, labor) Brynjolfsson and Hitt (2002) found a positive return on IT

investments. In 2002, Dedrick, Gurbaxani, and Kraemer concluded that greater investment in IT is associated with greater productivity growth at the company and country level. Research by Tallon, Kraemer, and Gurbaxani (2000) based on executive perspectives concluded that the degree of alignment between the IT strategy and the firm's business strategy was important and that investment alone was not enough. These studies substantiate the relationship between IT and business value.

As consensus among economists was developing on the role of IT in improving productivity, Nicholas Carr published an article called "IT Doesn't Matter." In that article, Carr argued that IT was becoming a routine input, a commodity, that could no longer enable firms to achieve a strategic advantage and continued investment in IT is a poor strategy (Carr, 2003). The response from gurus in the IT field was immediate. Individuals like Paul Strassmann, John Seely Brown, and Chris Langdon, along with numerous business school professors, responded, as did several leading CIOs. These individuals outlined counter-arguments that were powerful, articulate, and persuasive. There was one downside. The responses were targeted for IT professionals, whereas Carr wrote his original article for CEOs (House 2004).

The seeming disagreement between Carr and the economists is largely a matter of their differing perspectives. Economic research provides evidence that IT creates value when examining data across hundreds of firms or an entire economy. Carr and other strategic management writers are interested in the ability of IT to enable a sustainable competitive advantage for a firm. Given the difference in perspectives, the actual disagreements are less than they appear.

IT investment alone is not guaranteed to improve productivity. In addition to investing in IT, the enterprise must also manage the IT ecosystem and business process. Brynjolfsson, Hitt, and Yang (2002) found that firms that invest in IT without making the requisite organizational investments do worse than firms that stand pat. Smith and Fingar (2003) wrote in a book rebutting Carr's claims, "IT doesn't matter—business processes do."

There are many approaches for quantifying IT payoffs, ranging from highly scientific to the purely subjective (Wen and Sylla, 1999). A case can be made that the more traditional valuation methods that focus solely on costs and tangible benefits quantifiable at a firm level are incomplete. It is important to objectively measure all aspects of business value for specific IT solutions and the changes that result. I believe determining the business value of improvements in individual worker performance helps facilitate alignment between IT initiatives and business objectives.

Intel's IT Business Value Program

At the end of 2001, Intel challenged its IT organization to measure the bottom-line impact—the business value—of their IT solutions. Delivering IT solutions in a technology company compounded the challenge and intensified the scrutiny when data-driven proof was made a requirement.

To meet this challenge, IT implemented the IT Business Value program to assess both the forecasted value of an IT solution and the actual business value delivered to our customers and to Intel Corporation as a whole. The ITBV program developed the following:

- A standard set of financial measurements of business value, which we call *business value dials*, that serve as a common language throughout the company and are based on customer business objectives.
- A standard measurement methodology to determine the impact of IT solutions.
- A common valuation process with finance acting as independent auditors.
- A business-value portfolio of the forecasted and delivered results determined by customer-generated critical success indicators.
- A set of ground rules used to define the program's operation and to drive accountability for the business value realized by our customers.

The ITBV team also added an organizational performance evaluation metric to Intel's employee bonus (EB) program to ensure motivation and to encourage everyone to work toward the same end.

Before the ITBV program, Intel's IT organization measured success, like many IT organizations, in terms of higher network availability, server uptime, and number of calls answered, and so forth. The ITBV program significantly expanded the metrics being tracked to include those related to an improved bottom-line, such as time to market for Intel products, increased revenue, capital purchase avoidance, and measured improvements in employee productivity.

The ITBV program team worked with business units across Intel to develop and apply standard metrics and methods for capturing the forecasted and actual value of information technology products, services, and solutions. Whether in the factory, among design engineers, or in the standard office setting, the team quantified IT's impact, developing

methods for tracing benefits and forging a closer partnership between our internal customers and IT.

- In 2002 the ITBV program set a goal of \$100 million and successfully documented over \$180 million in new business value that Intel's IT delivered to the corporation. In 2003, the goal was raised to \$250 million, and the program documented \$419 million in new business value.
- In 2002 and 2003 ITBV capped the maximum value any one program could contribute to the goal, at \$20 million and \$40 million respectively. This was done to prevent any one project from accounting for the majority of the business value goal for that year.
- In 2004 the employee incentive connection was removed, as well as the cap on programs, and the goal was set at \$400 million. In 2004 the program documented \$479 million in new business value. In the end, we documented over \$1 billion in new business value in those three years.

Formalizing the measurement of business value has changed the corporate attitude toward the value of investing in information technology. Project owners are more willing and more equipped to document, measure and objectively demonstrate the value of their projects in customer terms.

I believe that it is critical for IT organizations to adopt metrics and measures of information technology's value as part of their approval, development, and implementation processes. Focusing on data and keeping the customer involved encourages the line-of-business owners to invest the time to evaluate their project's impact on the company's bottom line.

Managing Information Technology

In 2004 Martin Curley published *Managing IT for Business Value*. His book covers many of the processes used within Intel and elsewhere to maximize the business value that the IT organization delivers to the corporation. Researchers at the Software Engineering Institute (SEI) at Carnegie Mellon University had developed the idea of a capability maturity model (CMM) when looking at ways to improve the software development process. Curley applied the concept to business processes

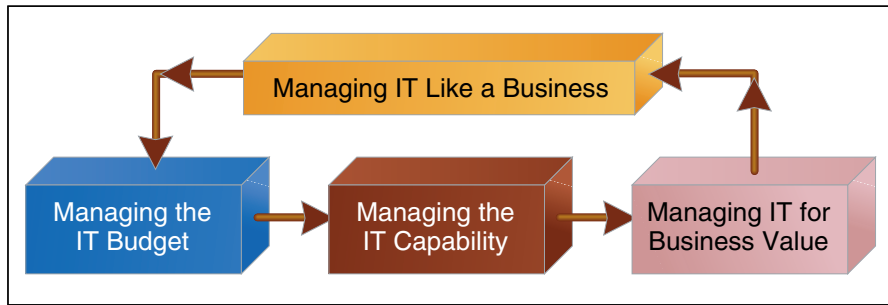


Figure 1.2 CMF Strategies

Source: Curley 2006

instead of software development and placed these processes within an IT Capability Maturity Framework (CMF). The IT CMF suggests that as the IT discipline continues to coalesce, it will continue to develop systematic approaches to managing and measuring business value. A fundamental idea within the IT CMF is that investment decisions require repeatable processes describing practices that an IT organization should use to effectively manage information technology to maximize the business value delivered to the company.

This book, *Measuring the Business Value of Information Technology*, is designed to expand on a subset of concepts contained within Curley's book and provide a blueprint of processes and methodologies that can be used to establish an IT Business Value program within your organization. I will review the metrics, studies, and processes developed as a part of our ITBV program.

IT Capability Maturity Framework Overview

At Intel, we view IT management as a production function, as shown in Figure 1.2. The *IT Budget* provides the essential input to the production process. The budget drives *IT Capability* which, in turn, produces *IT Value* as the output. *Managing IT Like a Business* is the feedback mechanism for adjusting the budget, capability, and value to optimize the outputs. The entire production system describes IT governance, which is the overall management, decision making, and accountability needed to maximize value within given constraints (e.g., acceptable levels of risk, regulatory compliance). In this model the IT budget is used to not only fund the envisioning, development, operations, and provisioning of IT solutions, but also to develop the IT capability, the underlying assets, and to strengthen the IT value chain.

The maturity of each of these functions is described by five stages, or levels, as shown in Figure 1.3. Initially, these functions are *ad hoc*, which means that the IT organization is barely managed at all. At the second stage, basic processes have been identified and can be repeated. In the case of the IT budget, for example, budget performance has become predictable. Level three is marked by sharper process definitions. In the case of the IT business value function, attention shifts from total cost of ownership to a more precise definition of return on investment (ROI). The fourth level is marked by improved process management. In terms of IT capability, the shift to level 4 is attained when the IT organization provides more than technology expertise and becomes a strategic business partner for the enterprise as a whole. The fifth and final level is marked by process optimization. The IT budget is sustainable, IT

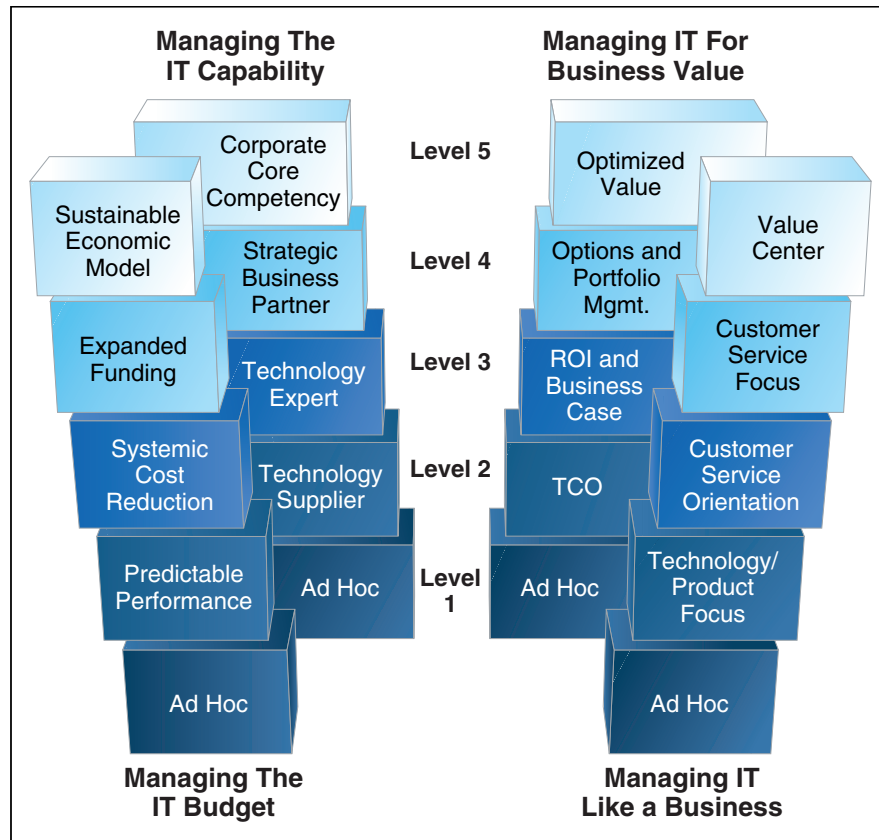


Figure 1.3 IT Capability Maturity Frameworks

Source: Curley 2006

capability is a core competency for the enterprise, business value is optimized, and the IT organization is viewed as a value center (vs. a cost center).

As capabilities mature within a firm, the IT organization will climb the maturity staircases in parallel. Creating world-class practices around managing IT for business value without the IT capability to deliver value is clearly not an optimized situation. It is more common and effective for an organization to achieve level-3 capabilities across the board and then to focus on moving ahead to level 4 for all four capabilities.

I recommend that IT organizations routinely perform an IT Business Value maturity assessment to verify progress against previous measures and to identify what improvement actions to take next. Only through concerted, coordinated action will the overall business value delivered through IT be improved and ultimately reflected in business performance.

Establishing an ITBV program is one of the most important initiatives an IT organization can engage in to drive towards higher levels of the IT CME. Launching an ITBV program helps to ensure that the value IT aims to deliver is aligned with customer or end-user needs, to document forecasted and actual business value delivered systematically, and to communicate this bottom-line impact in the customer's language. The ITBV team directly supports the business plan for the IT organization and creates the processes that measure and maximize the business value that IT is delivering.

IT organizations must demonstrate their bottom-line impact as they continue to battle for limited budgetary resources, and must enable a competitive advantage for their firm by expanding their focus to new key processes, such as user experience design. As companies start to realize the value that can be achieved by delivering compelling and innovative user experiences, they will look to IT organizations to deliver on this front. Is your IT organization capable and up to the challenge?

How to Use this Book

Core chapters of this book build one upon another beginning with business value measurement in Chapter 2 and ending with the ITBV program in Chapter 6. These chapters are best read in sequence. Appendices and remaining chapters can be sampled at any time.

This book is organized in a layered architecture, as shown in Figure 1.4. Basic concepts provide a foundation for conducting ITBV studies and a collection of systematic studies constitutes an ITBV program. Here is how the story unfolds:

- Chapter 1 is an introductory chapter that identifies the overall goals for this book, defines basic terms, and establishes the relationship between IT and business value. It also offers a production-system model along with capability maturity frameworks that are the basis for identifying and maximizing business value contributions from IT investments.
- Chapter 2 enriches the concept of business value and introduces business value dials, which is Intel’s way of describing the indica-

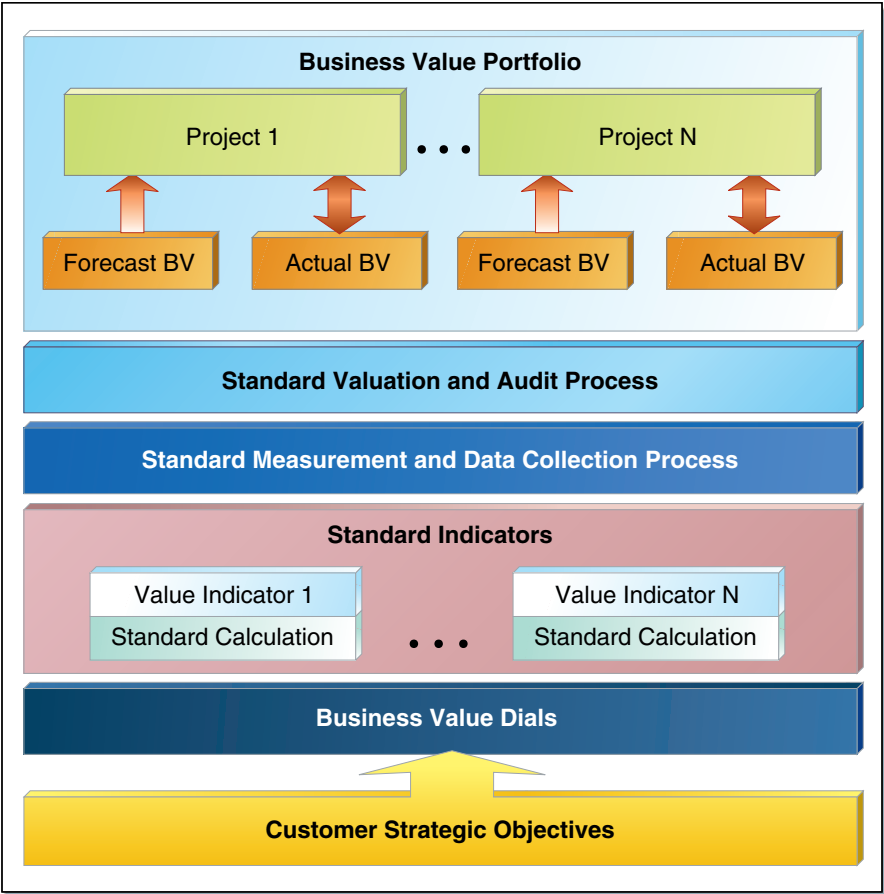


Figure 1.4 Business Value Architecture

tors that measure value contributions. Chapter 2 introduces the overall measurement framework and provides a 13-step overview of the business value process.

- Chapter 3 examines business value from a financial point of view. ROI and its relationship to the time value of money is one of several financial ratios presented. The business value concept is instantiated with a multitude of examples.
- Chapter 4 describes how to measure the impact of IT on employee productivity. Often described as a soft benefit, productivity can be measured using tools drawn from human factors engineering, statistics, and experimental design.
- Chapter 5 explains the design of an ITBV study and pulls together the financial and productivity tools developed previously. Readers will find this chapter to be the turning point as the entire ITBV process comes to life.
- Chapter 6 describes in detail how to launch an ITBV program and includes specifications for staffing and skill sets. A key concern is how ITBV is integrated into the enterprise as a whole.
- In Chapter 7 we describe how Intel's ITBV program was launched. This insider's view will be especially valuable to IT strategists in larger corporations.
- Chapter 8 looks ahead to summarize academic work and evaluate its utility to ITBV practitioners. We discuss ongoing research at Intel and speculate how user experience design will improve the business value of IT.
- Appendix A provides business-school style case study of a health care provider's use of innovative technology to create business value. The case explores the innovative use of IT to improve patient throughput at St. Vincent's hospital.
- Appendix B contains two examples of business value studies. They include the quantification of enterprise software deployment for team collaboration and the deployment of technology into manufacturing.
- Appendix C provides additional details about the tools and processes required to implement and run a program.

Summary

Implementing an innovative approach to determine the business value of information technology is an enormous task, but the payoff for the IT organization and the enterprise as a whole is worth the effort. The ITBV program developed processes and metrics that quantified \$1.39 billion in bottom-line impact from information technology over the first three years.

The tools and methodologies produced by an ITBV program easily fit within other common management practices. As Martin Curley has shown, ITBV process improvement is well supported by capability maturity frameworks as IT organizations uncover and define processes, measure and optimize metrics, and build sustainable excellence in four management domains, IT budget, IT capability, IT business value, and IT as a business.

From research done to build the program, we have concluded that to create a world-class IT organization that clearly demonstrates bottom-line impact for the company, the culture must shift from techno-centric to user-centric thinking. IT strategists will need to develop and systematically implement a uniform business value language. The firm will need to establish a dedicated team that is supported by upper management, charter this team to define rules which govern program, and develop and systematically use a standard measurement and valuation process.

An ITBV perspective is often a new mind set for IT professionals and the corporation. Measured results instill a belief that IT can and should help create a competitive advantage and increase shareholder value by not just deploying information technology, but deploying the right information technology.