# 1.3 Information System Architecture

# IS Architecture -Introduction

- An information system architecture is a formal definition of
  - the business processes and rules,
  - systems structure,
  - technical framework, and
  - product technologies for a business or organizational information system.
- An information system architecture usually consists of four layers:
  - business process architecture,
  - systems architecture,
  - technical architecture, and
  - product delivery architecture.

# Contd…

- The architecture of an information system <span style="color:red">encompasses the hardware and software used to deliver the solution to the final consumer of services.</span>
- The architecture is a description of the design and contents of a computerized system.
- If documented, the architecture may include information such as
  - a detailed inventory of current hardware, software and networking capabilities;
  - a description of long-range plans and priorities for future purchases, and
  - a plan for upgrading and/or replacing outdated equipment and software.
- The architecture should document: What data is stored?, How does the system function?, Where are components located?, When do activities and events occur in the system?, and Why does the system exist?

# Enterprise Architecture

- Enterprise architecture is an ongoing business function that helps an 'enterprise' <span style="color:red">figure out how to execute best the strategies that drive its development</span>
- **Enterprise architecture and system development** defines
  - the broad structure of a system, consisting of its parts,
  - their interrelationships and
  - other visible properties

Consists of constituent units such as

1. <span style="color:red">Business architecture</span> -Describes the processes the business uses to meet its goals,
2. <span style="color:red">Technology architecture</span> Describes the hardware and software infrastructure that supports applications and their interactions and
3. <span style="color:red">Information systems architecture</span> -Describes how specific Applications are designed and how they interact with each other(application Architecture) & describes how the enterprise data stores are organized and accessed(Data Architecture).

# Contd…

Taken together, they ensure that an organization:

- Meets stakeholder needs
- Aligns its IT with business purposes
- Integrates all departments
- Promotes security
- Brings about data integrity and consistency and
- Reduces duplication and is cost-effective

# Contd…

- helps to establish the rules of governance and the ways in which the architecture process can be managed
-  Enterprise architecture engagement ensures that EA standards and guidelines are put into effect.
- It sets out rules specifying ways in which **Enterprise Architecture and strategic planning** can be carried out by projects.
- It is an intrinsic part of enterprise architecture governance process.

# 1.4 Qualities of Information System

# IS Quality

- It is often pragmatically defined as: "The fitness for use of the information provided."

- "Information quality" is a measure of the value which the information provides to the user of that information

- **Authority/Verifiability**

   Authority refers to the expertise or recognized official status of a source.

   Verifiability refers to the ability of a reader to verify the validity of the information irrespective of how authoritative the source is.

- **Scope of coverage**

   Scope of coverage refers to the extent to which a source explores a topic.

- **Composition and Organization**

   Composition and Organization has to do with the ability of the information source to present it's particular message in a coherent, logically sequential manner.

- **Objectivity**

   Objectivity is the bias or opinion expressed when a writer interprets or analyze facts.
- **Integrity**

   Adherence to moral and ethical principles; soundness of moral character

   The state of being whole, entire, or undiminished
- **Comprehensiveness**

   Of large scope; covering or involving much; inclusive: a comprehensive study.

- **Validity**
- Validity of some information has to do with the degree of obvious truthfulness which the information caries
- **Uniqueness**
- As much as 'uniqueness' of a given piece of information is intuitive in meaning, it also significantly implies not only the originating point of the information but also the manner in which it is presented and thus the perception which it conjures.
- **Timeliness**

  Timeliness refers to information that is current at the time of publication. Consider publication, creation and revision dates. Beware of Web site scripting that automatically reflects the current day's date on a page.
- **Reproducibility** (utilized primarily when referring to instructive information)

  Means that documented methods are capable of being used on the same data set to achieve a consistent result.

# 1.6 Balanced Scorecard

# The Balanced Scorecard What is it?

Definition:

The Balanced Scorecard is a management tool that provides stakeholders with a comprehensive measure of how the organization is progressing towards the achievement of its strategic goals.

# The Balanced Scorecard
# What is it?

The Balanced Scorecard:

- Balances financial and non-financial measures

- Balances short and long-term measures

- Balances performance drivers (leading indicators) with outcome measures (lagging indicators)

- Should contain just enough data to give a complete picture of organizational performance… and no more!

- Leads to strategic focus and organizational alignment.

# Historical Background-BSC

- It was originated by Drs. Robert Kaplan (Harvard Business School) and David Norton as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics to give managers and executives a more 'balanced' view of organizational performance.

# Contd…

- While the phrase balanced scorecard was coined in the early 1990s, the roots of the this type of approach are deep, and include the pioneering work of General Electric on performance measurement reporting in the 1950's and the work of French process engineers (who created the *Tableau de Bord* – literally, a "dashboard" of performance measures) in the early part of the 20th century.

- The balanced scorecard has evolved from its early use as a simple performance measurement framework to a full <u>strategic planning and management system</u>.
- The "new" balanced scorecard transforms an organization's strategic plan from an attractive but passive document into the "marching orders" for the organization on a daily basis.

- It provides a framework that not only provides performance measurements, but helps planners identify what should be done and measured.
- It enables executives to truly execute their strategies.

# The Balanced Scorecard Why do it?

- To achieve strategic objectives.
- To provide quality with fewer resources.
- To eliminate non-value added efforts.
- To align customer priorities and expectations with the customer.
- To track progress.
- To evaluate process changes.
- To continually improve.
- To increase accountability.

# Advantages to this Approach

- ✓ Simple to Use and Understand
- ✓ Based on Vision and Strategy
- ✓ Multidimensional
  - Quantitative and Qualitative Measures
  - Current and Future
- ✓ Provides Measurement of and Method for  Improving our Services
- ✓ Ties QI initiatives together
- ✓ Serves as a Communication Tool

- "The balanced scorecard retains traditional financial measures.
- But financial measures tell the story of past events, an adequate story for industrial age companies for which investments in long-term capabilities and customer relationships were not critical for success.

- These financial measures are inadequate, however, for guiding and evaluating the journey that information age companies must make to create future value through investment in customers, suppliers, employees, processes, technology, and innovation."

# Perspectives

- The balanced scorecard suggests that we view the organization from four perspectives, and to develop metrics, collect data and analyze it relative to each of these perspectives:

# The Learning & Growth Perspective

- This perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement.

-  In a knowledge-worker organization, people -- the only repository of knowledge -- are the main resource.

-

- In the current climate of rapid technological change, it is becoming necessary for knowledge workers to be in a continuous learning mode.
-  Metrics can be put into place to guide managers in focusing training funds where they can help the most
- In any case, learning and growth constitute the essential foundation for success of any knowledge-worker organization.

- Kaplan and Norton emphasize that 'learning' is more than 'training';
- it also includes things like mentors and tutors within the organization, as well as that ease of communication among workers that allows them to readily get help on a problem when it is needed.
- It also includes technological tools; what the Baldrige criteria call "high performance work systems."

# The Business Process Perspective

- This perspective refers to internal business processes.

- Metrics based on this perspective allow the managers to know how well their business is running, and whether its products and services conform to customer requirements (the mission).

- These metrics have to be carefully designed by those who know these processes most intimately;

- with the unique missions these are not something that can be developed by outside consultants.

# The Customer Perspective

- Recent management philosophy has shown an increasing realization of the importance of customer focus and customer satisfaction in any business.

- These are leading indicators: if customers are not satisfied, they will eventually find other suppliers that will meet their needs.

- Poor performance from this perspective is thus a leading indicator of future decline, even though the current financial picture may look good.

- In developing metrics for satisfaction, customers should be analyzed in terms of kinds of customers and the kinds of processes for which we are providing a product or service to those customer groups.
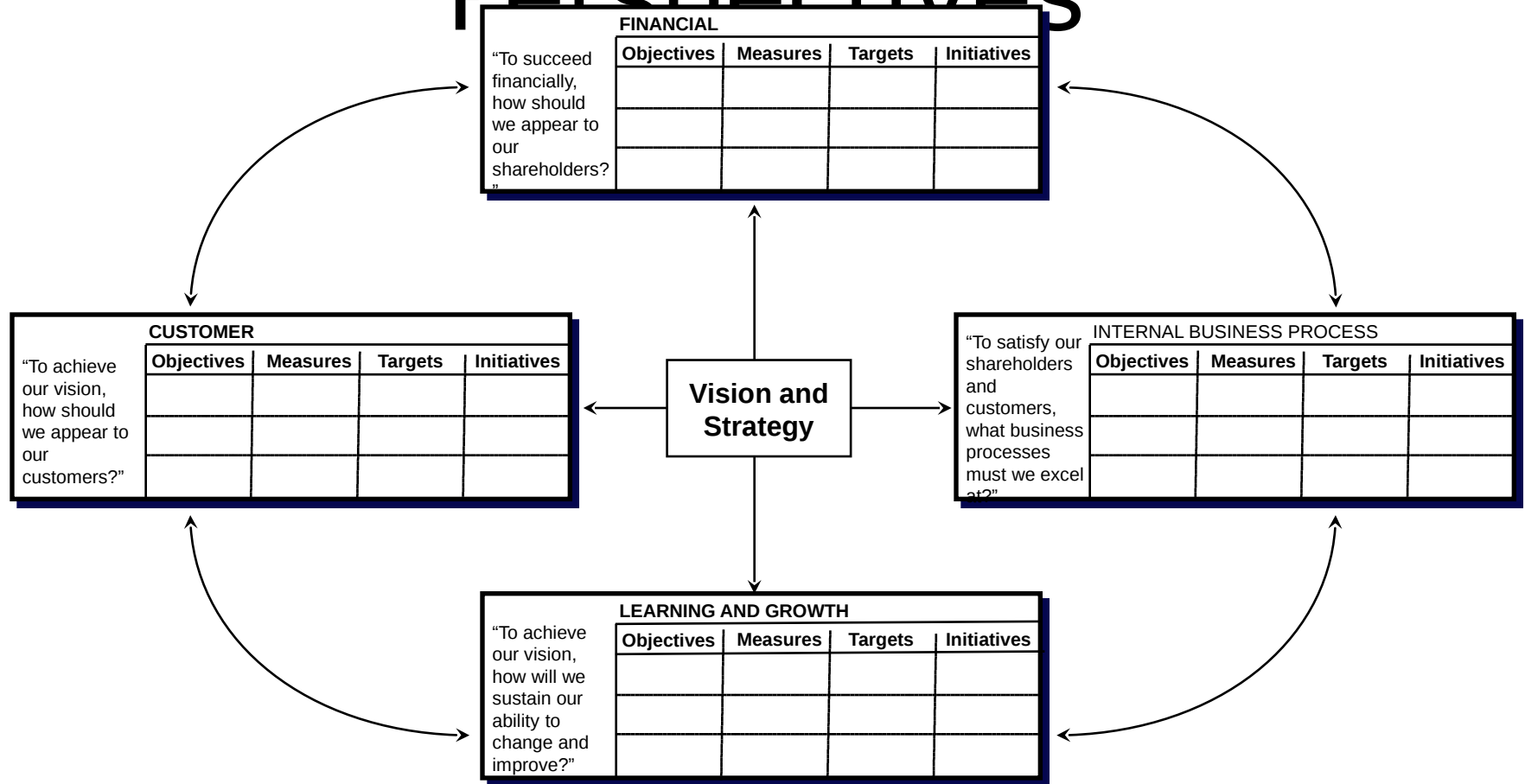
# The Financial Perspective

- Kaplan and Norton do not disregard the traditional need for financial data.

- Timely and accurate funding data will always be a priority, and managers will do whatever necessary to provide it.

- In fact, often there is more than enough handling and processing of financial data.

- With the implementation of a corporate database, it is hoped that more of the processing can be centralized and automated

- But the point is that the current emphasis on financials leads to the "unbalanced" situation with regard to other perspectives.
- There is perhaps a need to include additional financial-related data, such as risk assessment and cost-benefit data, in this category.

# Strategy Mapping

- Strategy maps are communication tools used to tell a story of how value is created for the organization.

- They show a logical, step-by-step connection between strategic objectives (shown as ovals on the map) in the form of a cause-and-effect chain.

-  Generally speaking, improving performance in the objectives found in the Learning & Growth perspective (the bottom row) enables the organization to improve its Internal Process perspective Objectives (the next row up), which in turn enables the organization to create desirable results in the Customer and Financial perspectives (the top two rows).

# Translating Vision and Strategy: Four Perspectives

**FINANCIAL**

"To succeed financially, how should we appear to our shareholders?"

| Objectives | Measures | Targets | Initiatives |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**CUSTOMER**

"To achieve our vision, how should we appear to our customers?"

| Objectives | Measures | Targets | Initiatives |
|---|---|---|---|
| | | | |
| | | | |

**Vision and Strategy**

**INTERNAL BUSINESS PROCESS**

"To satisfy our shareholders and customers, what business processes must we excel at?"

| Objectives | Measures | Targets | Initiatives |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**LEARNING AND GROWTH**

"To achieve our vision, how will we sustain our ability to change and improve?"

| Objectives | Measures | Targets | Initiatives |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

# The Balanced Scorecard Focuses on Factors that Create Long-Term Value

- Traditional financial reports look backward
  - Reflect only the past: spending incurred and revenues earned
  - Do not measure creation or destruction of future economic value
- The Balanced Scorecard identifies the factors that create long-term economic value in an organization, for example:
  - Customer Focus:  satisfy, retain and acquire customers in targeted segments
  - Business Processes:  deliver the value proposition to targeted customers
    - innovative products and services
    - high-quality, flexible, and responsive operating processes
    - excellent post-sales support
  - Organizational Learning & Growth:
    - develop skilled, motivated employees;
    - provide access to strategic information
    - align individuals and teams to business unit objectives

Customers

Processes

People
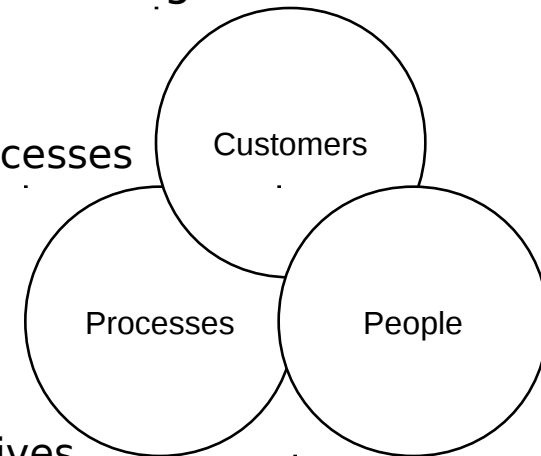
# The Four Perspectives Apply to Mission Driven As Well As Profit Driven Organizations

**Profit Driven**

**Mission Driven**

- What must we do to satisfy our <u>shareholders</u>?

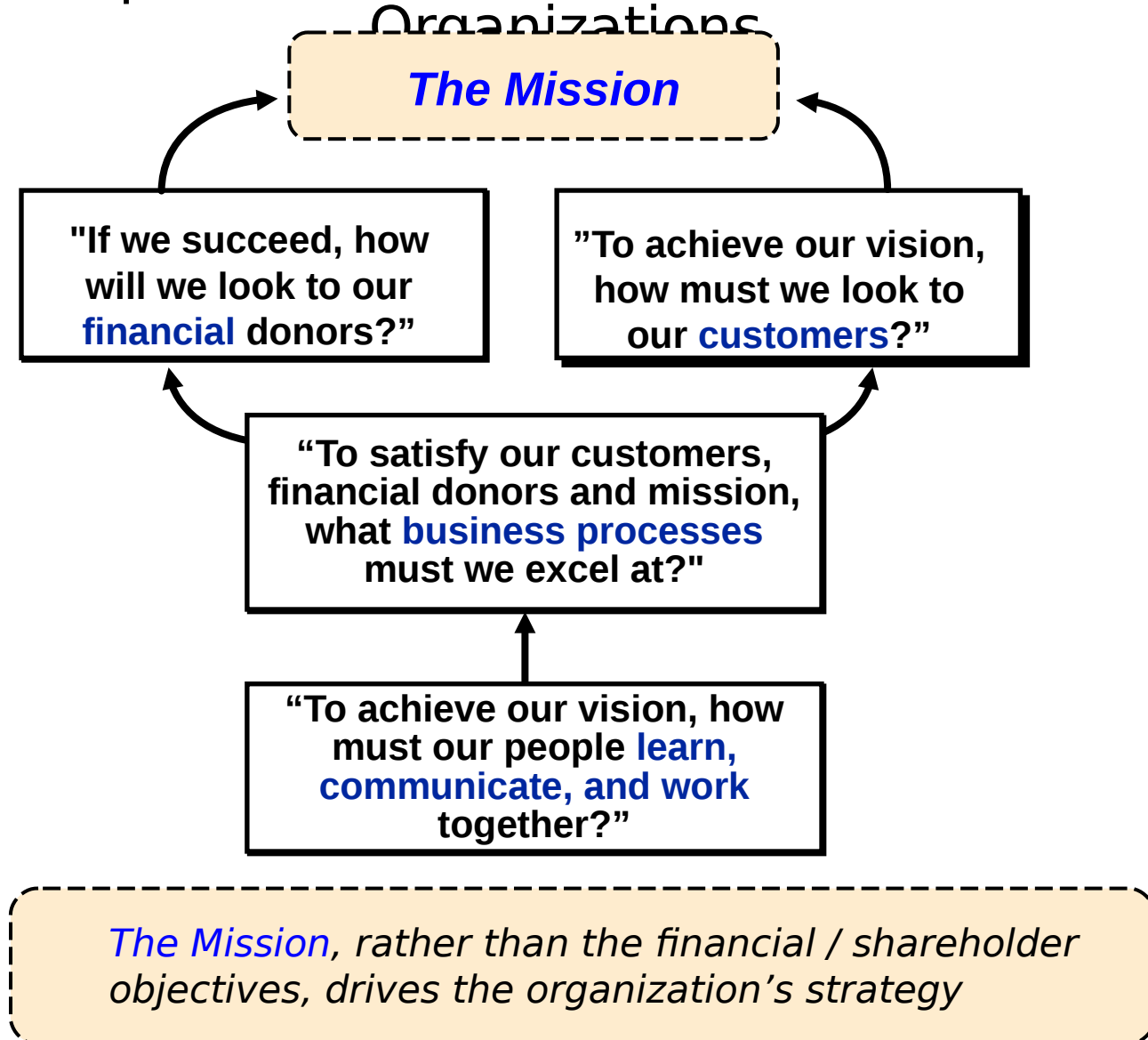*Financial Perspective*

- What must we do to satisfy our <u>financial contributors</u>?
- What are our fiscal obligations?

- What do our <u>customers</u> expect from us?

*Customer Perspective*

- <u>Who</u> is our <u>customer</u>?
- What do our customers expect from us?

- What <u>internal processes</u> must we excel at to satisfy our shareholder and customer?

*Internal Perspective*

- What <u>internal processes</u> must we excel at to satisfy our fiscal obligations, our customers and the requirements of our <u>mission</u>?

- How must our people learn and develop <u>skills to respond</u> to these and future challenges?

*Learning & Growth Perspective*

- How must our people learn and develop <u>skills to respond</u> to these and future challenges?

Answering these questions is the first step to develop a Balanced Scorecard

# The Balanced Scorecard Framework Is Readily Adapted to Non-Profit and Government Organizations

**The Mission**

**"If we succeed, how will we look to our financial donors?"**

**"To achieve our vision, how must we look to our customers?"**

**"To satisfy our customers, financial donors and mission, what business processes must we excel at?"**

**"To achieve our vision, how must our people learn, communicate, and work together?"**

*The Mission, rather than the financial / shareholder objectives, drives the organization's strategy*

# Why are Companies Adopting a Balanced Scorecard?

- **Change**

Formulate and communicate a new strategy for a more competitive environment

- **Growth**

Increase revenues, not just cut costs and enhance productivity

- **Implement**

From the 10 to the 10,000.  Every employee implements the new growth strategy in their day-to-day operations
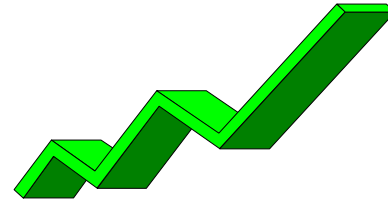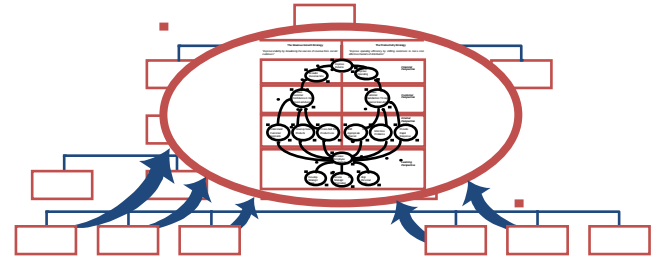
# Why Do We Need a Balanced Scorecard?
# To Implement Business Strategy!

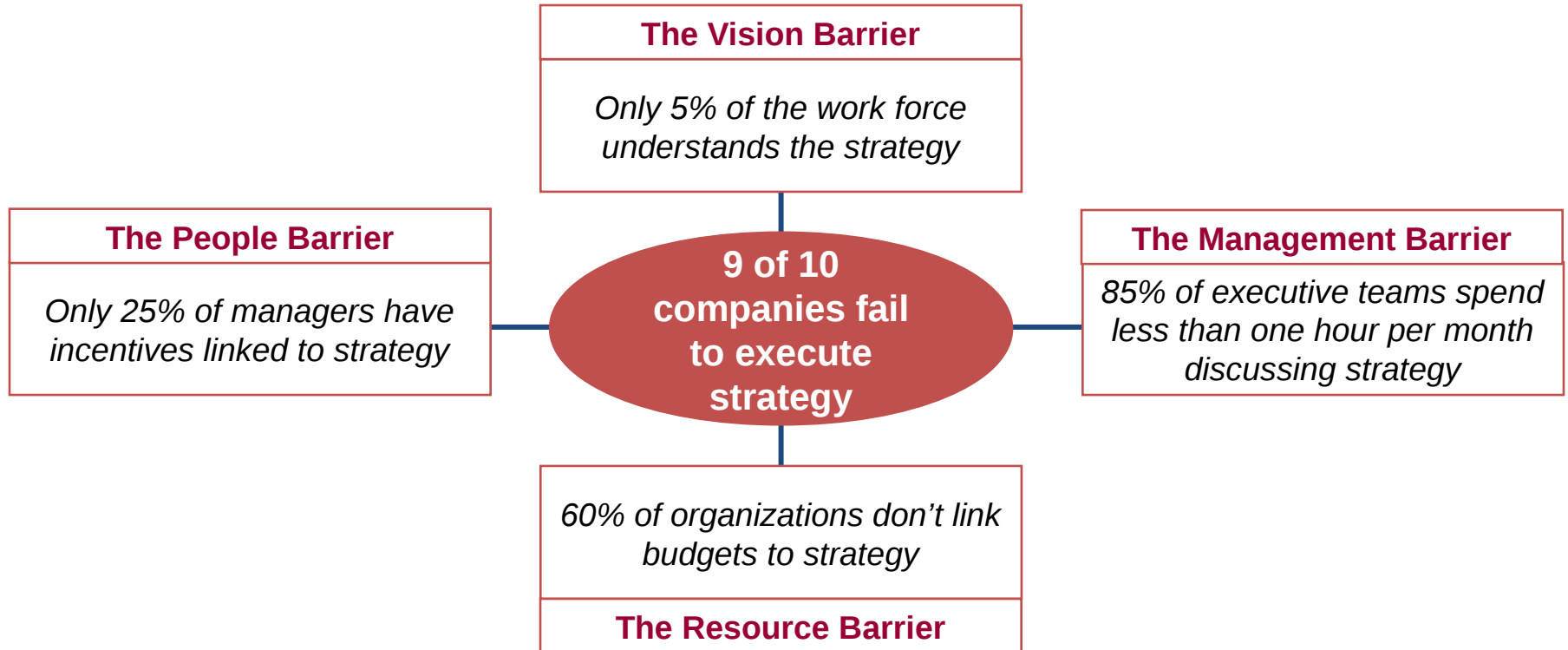*"Business Strategy is now the single most important issue… and will remain so for the next five years"*

*Business Week*

*"Less than 10% of strategies effectively formulated are effectively executed"*

*Fortune*

# Four Barriers to Strategic Implementation

**The Vision Barrier**

*Only 5% of the work force understands the strategy*

**The People Barrier**

*Only 25% of managers have incentives linked to strategy*

**9 of 10 companies fail to execute strategy**

**The Management Barrier**

*85% of executive teams spend less than one hour per month discussing strategy*

*60% of organizations don't link budgets to strategy*
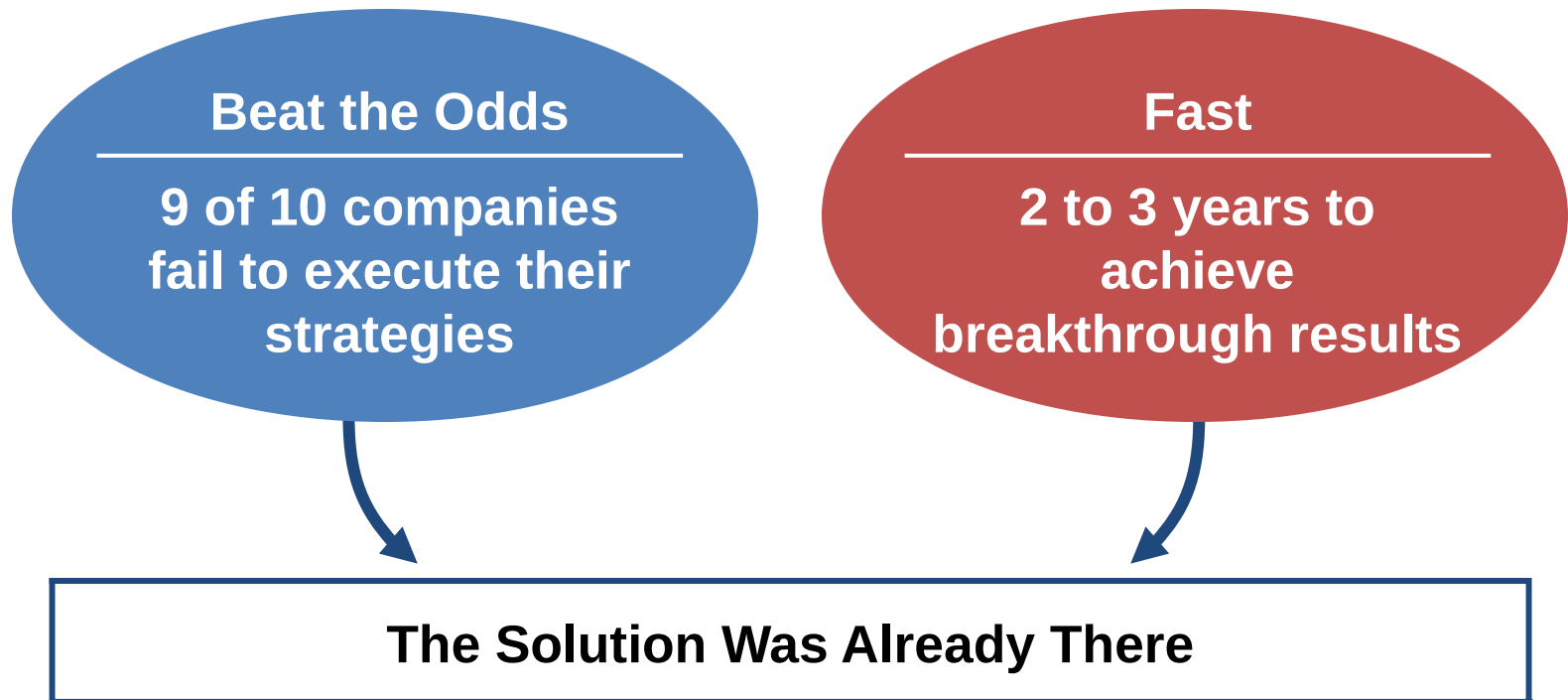
**The Resource Barrier**

**Today's Management Systems Were Designed to Meet The Needs of Stable Industrial Organizations That We're Changing Incrementally**

*You Can't Manage Strategy With a System Designed for Tactics*

# Balanced Scorecard "Early Adaptors" Have Executed Their Strategies Reliably and Rapidly

| **Mobil** (USM&R) | 1993 | #6 in profitability | 1995 | #1 in profitability |
| | | | 1996 | #1 in profitability |
| | | | 1997 | #1 in profitability |

| **CIGNA** Property & Casualty | 1993 | $275M loss  Stock Price = $59 | | *Profit* | *Stock* |
| | | | 1994 | $15M | $74 |
| | | | 1995 | $60M | $114 |
| | | | 1996 | $80M | $146 |
| | | | 1997 | $98M | $205 |

| **Brown & Root Engineering (Rockwater)** | 1993 | Losing money | 1996 | #1 in growth and profitability |

| **CHEMICAL** Retail Bank | 1993 | Profits = $x | 1994 | Profits = $8x |
| | | | 1995 | Profits = $13x |
| | | | 1996 | Profits = $19x |

# The BSC "Early Adaptors" Have Executed Their Strategies Reliably and Rapidly

**Beat the Odds**

9 of 10 companies fail to execute their strategies

**Fast**

2 to 3 years to achieve breakthrough results

**The Solution Was Already There**

- The BSC helped create focus and alignment to unlock the organization's "hidden assets"

*The Balanced Scorecard process allows an organization to align and focus all its resources on its strategy*

**BALANCED SCORECARD**

**STRATEGY**

**BUSINESS UNITS**

**EXECUTIVE TEAM**

**HUMAN RESOURCES**

**INFORMATION TECHNOLOGY**

**BUDGETS AND CAPITAL INVESTMENTS**
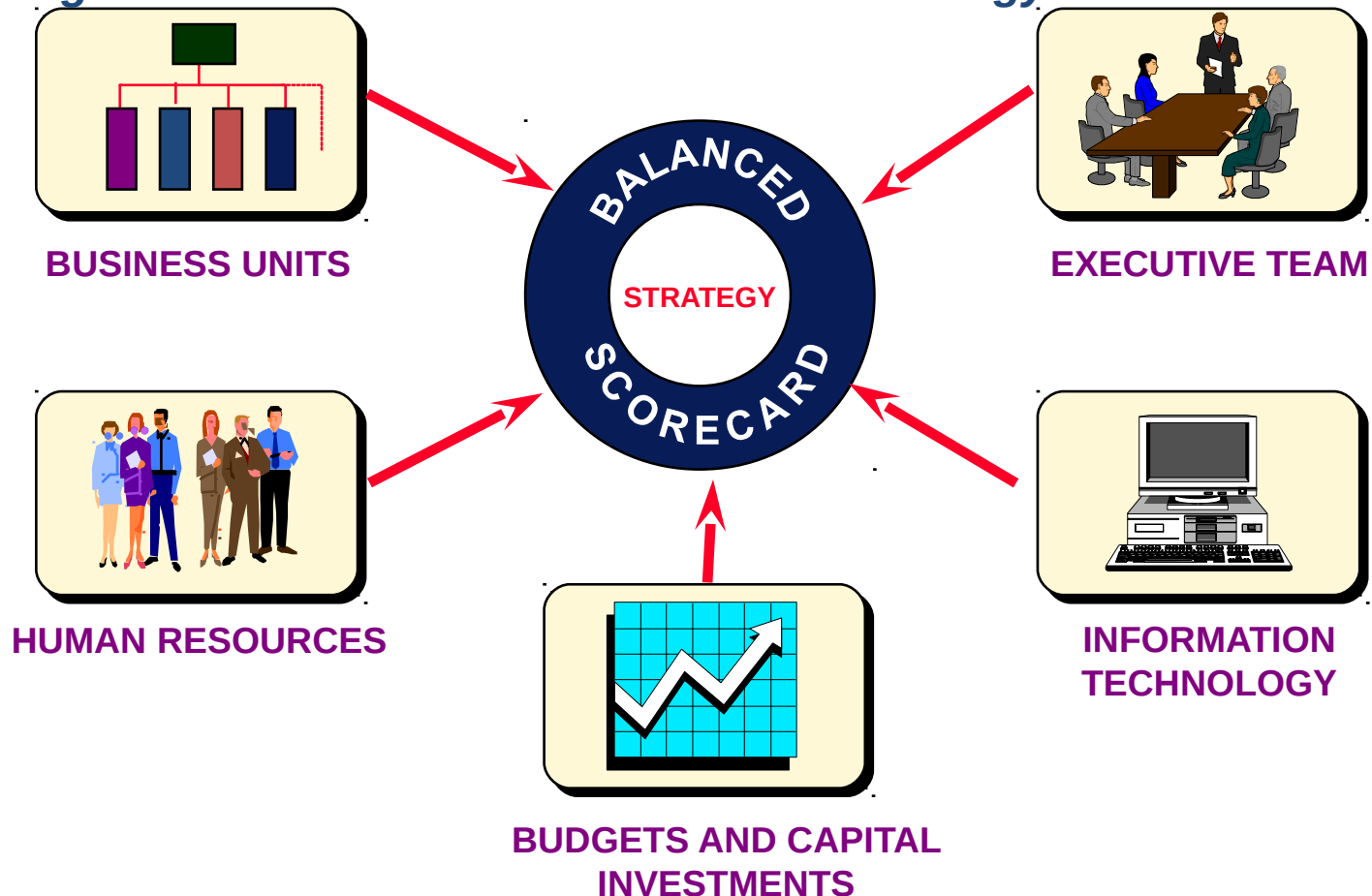
# How Do They Do It?

**The Seven Ingredients of Highly Successful Balanced Scorecard Programs**

1. A Process to *Mobilize* the Organization and Lead Ongoing Change

2. Scorecards That *Describe the Strategy*

3. Linking Scorecard to Create an *Organization Alignment*

4. Continuous *Communication* to Empower the Workforce

5. Aligning Personal *Goals, Incentives, and Competencies* With the Strategy

6. *Aligning Resources*, Budgets and Initiatives With the Strategy

7. A Feedback Process That Encourages *Learning* and Experience Sharing

# The Ingredients of Highly Successful Balanced Scorecard Programs

**1. Leadership From the Top**
- *Create the Climate for Change*
- *Create a Common Focus for Change Activities*
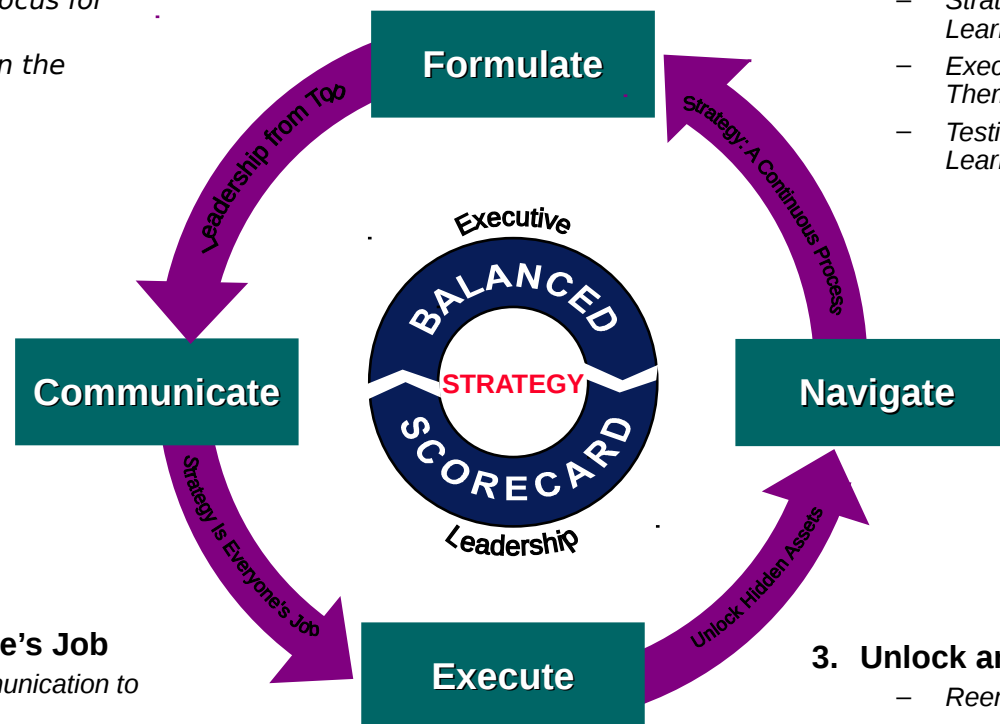- *Rationalize and Align the Organization*

**4. Make Strategy a Continuous Process**
- *Strategic Feedback That Encourages Learning*
- *Executive Teams Manage Strategic Themes*
- *Testing Hypotheses, Adapting, and Learning*



**2. Make Strategy Everyone's Job**
- *Comprehensive Communication to Create Awareness*
- *Align Goals and Incentives*
- *Integrate Budgeting with Strategic Planning*
- *Align Resources and Initiatives*

**3. Unlock and Focus Hidden Assets**
- *Reengineer Work Processes*
- *Create Knowledge Sharing Networks*

# A Good Balanced Scorecard Tells the Story of Your Strategy
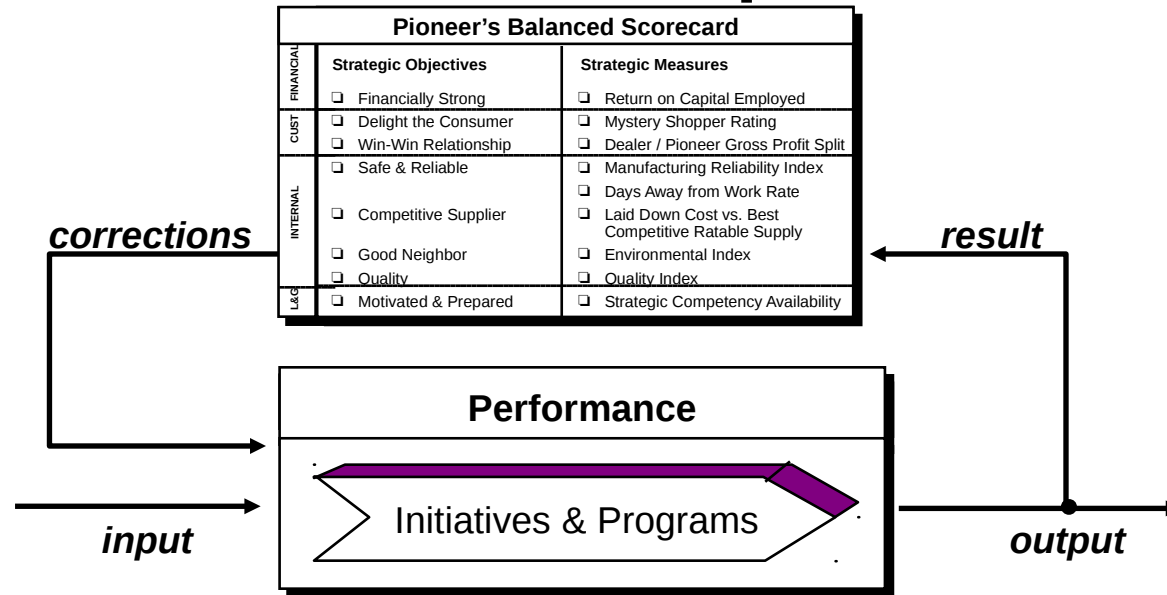
- Every measure is part of a chain of cause and effect linkages

- A balance exists between outcome measures and the performance drivers or desired outcomes

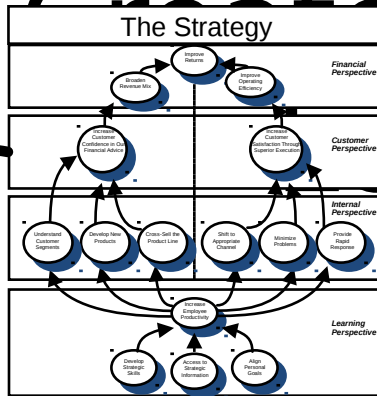# The Problem:  Most of Today's Feedback Systems Are "Controls" Oriented

**Variance Detected**

**Correction Applied**

...gement
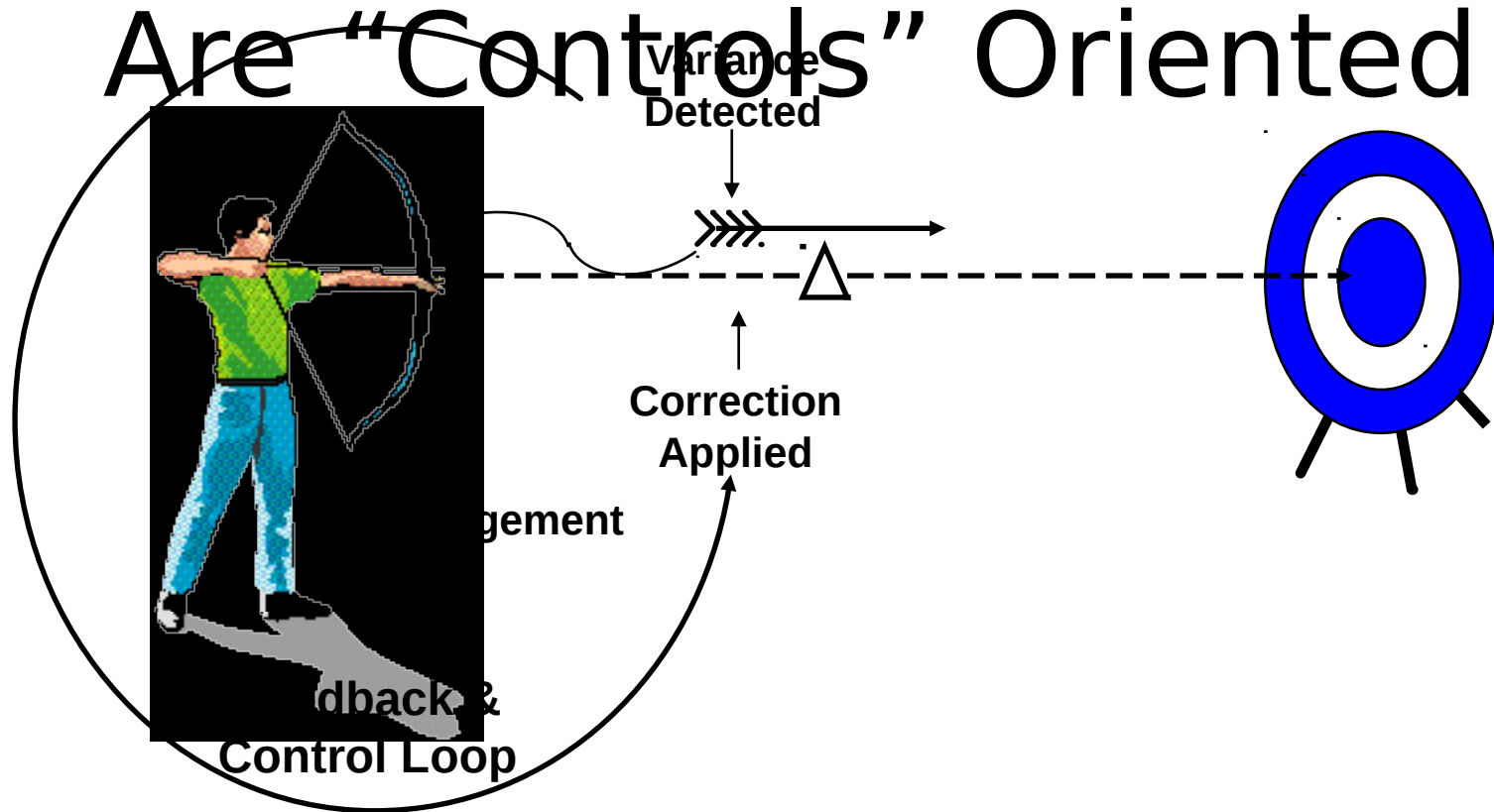
...dback &
Control Loop

# Strategic Learning – Some Basic Concepts…

**Replacing the budget with the Balanced Scorecard is a step in the right direction...**

| Pioneer's Balanced Scorecard | | |
|---|---|---|
| | **Strategic Objectives** | **Strategic Measures** |
| FINANCIAL | ❑ Financially Strong | ❑ Return on Capital Employed |
| CUST | ❑ Delight the Consumer | ❑ Mystery Shopper Rating |
| | ❑ Win-Win Relationship | ❑ Dealer / Pioneer Gross Profit Split |
| INTERNAL | ❑ Safe & Reliable | ❑ Manufacturing Reliability Index |
| | | ❑ Days Away from Work Rate |
| | ❑ Competitive Supplier | ❑ Laid Down Cost vs. Best Competitive Ratable Supply |
| | ❑ Good Neighbor | ❑ Environmental Index |
| | ❑ Quality | ❑ Quality Index |
| L&G | ❑ Motivated & Prepared | ❑ Strategic Competency Availability |

*corrections*

*result*

**Performance**

Initiatives & Programs

*input*

*output*

**It creates strategic <u>focus</u> but not strategic <u>learning</u>**

# Strategic Feedback Creates Strategic Learning

### The Strategy



**Financial Perspective**
Improve Returns
Broaden Revenue Mix
Improve Operating Efficiency

**Customer Perspective**
Increase Customer Confidence in Our Financial Advice
Increase Customer Satisfaction Through Superior Execution

**Internal Perspective**
Understand Customer Segments
Develop New Products
Cross-Sell the Product Line
Shift to Appropriate Channel
Minimize Problems
Provide Rapid Response

**Learning Perspective**
Increase Employee Productivity
Develop Strategic Skills
Access to Strategic Information
Align Personal Goals

*update the strategy*

*strategic learning loop*

## FOLLOW-UP ACTION
"Closing the loop"

## THE MANAGEMENT MEETING
"Team Problem Solving"

### Pioneer's Balanced Scorecard

| | Strategic Objectives | Strategic Measures |
|---|---|---|
| **FINANCIAL** | ❑ Financially Strong | ❑ Return on Capital Employed |
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| | ❑ Good Neighbor | ❑ Environmental Index |
| | ❑ Quality | ❑ Quality Index |
| **L&G** | ❑ Motivated & Prepared | ❑ Strategic Competency Availability |

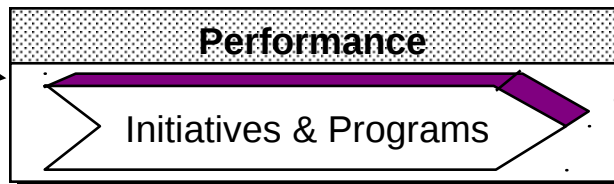*results*

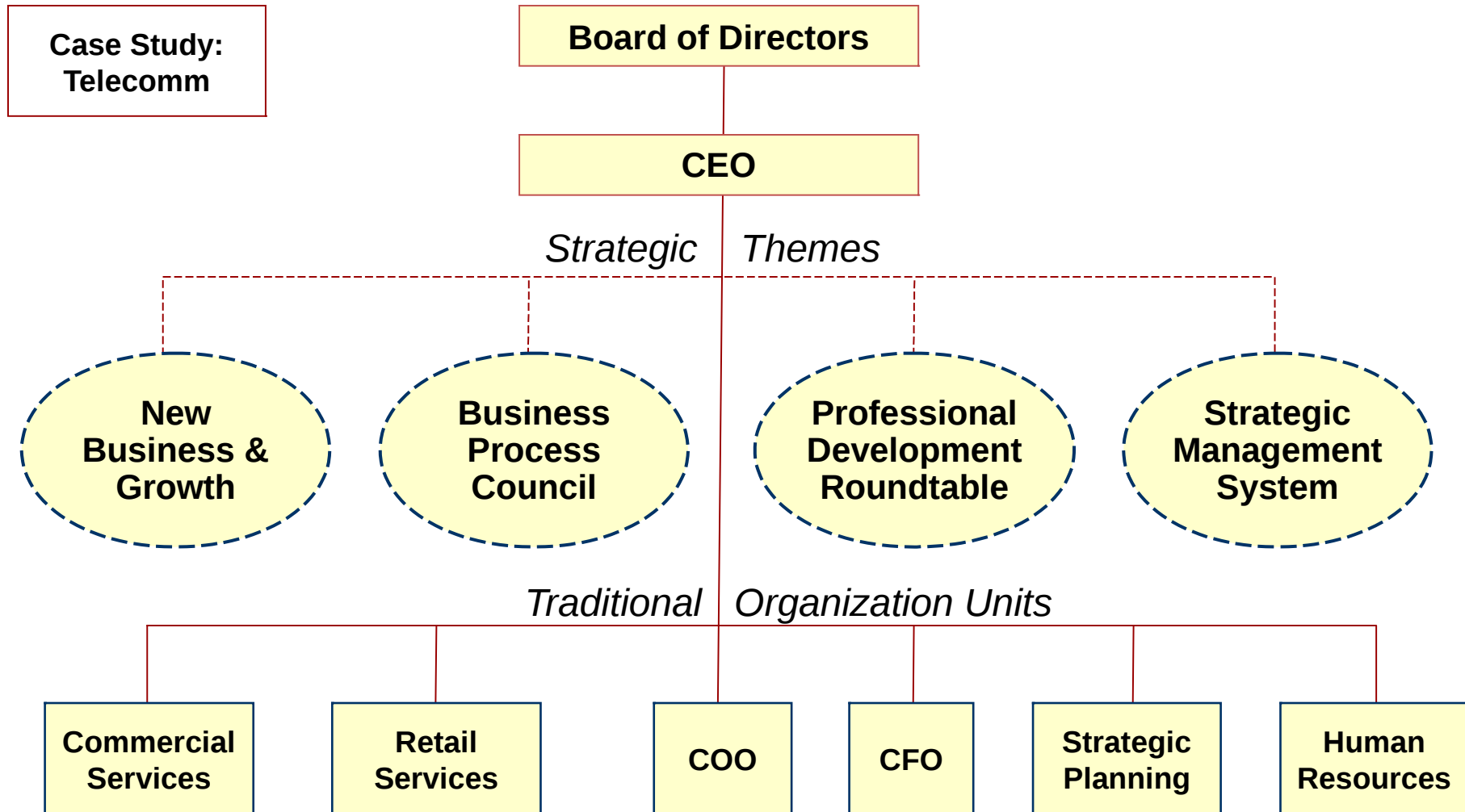## INSIGHT HARVESTING
"Testing hypotheses and capturing learning"

*reallocate priorities*

*operational control loop*

### Performance

Initiatives & Programs

*dialog*

# A New Structure for Corporate Governance– Executive Team Takes Responsibility for Managing the Strategic Cross-Functional Themes

Case Study: Telecomm

Board of Directors

CEO

*Strategic   Themes*

New Business & Growth

Business Process Council

Professional Development Roundtable

Strategic Management System

*Traditional   Organization Units*

Commercial Services

Retail Services

COO

CFO

Strategic Planning

Human Resources

# The Ingredients of Highly Successful Balanced Scorecard Programs

**1. Leadership From the Top**
- *Create the Climate for Change*
- *Create a Common Focus for Change Activities*
- *Rationalize and Align the Organization*
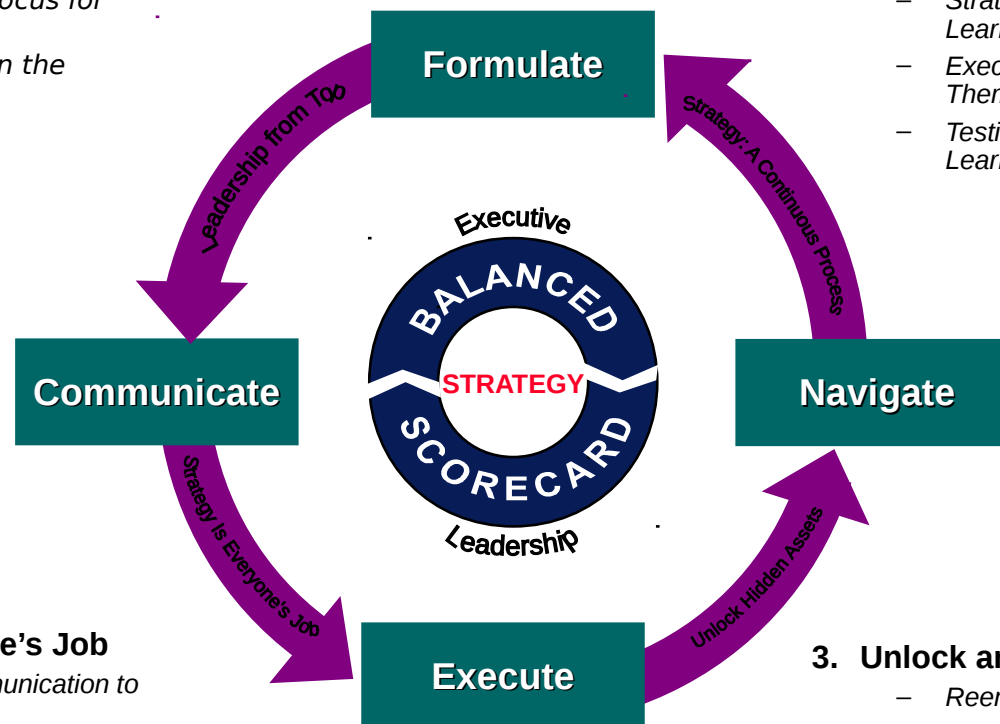
**4. Make Strategy a Continuous Process**
- *Strategic Feedback That Encourages Learning*
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- *Align Resources and Initiatives*

**3. Unlock and Focus Hidden Assets**
- *Reengineer Work Processes*
- *Create Knowledge Sharing Networks*

Formulate

Communicate

Navigate

Execute

Leadership from Top

Strategy: A Continuous Process

Strategy Is Everyone's Job

Unlock Hidden Assets

Executive

BALANCED

STRATEGY

SCORECARD

Leadership

# Not all Environments are Appropriate for a Balanced Scorecard

- **Balanced Scorecard must be driven from the top:**
  - **CEO/COO as sponsor**
  - **Executive leadership team commitment**

- **A clear sense of purpose is required to:**
  - **Drive change**
  - **Clarify and gain consensus about strategy**
  - **Build a senior executive team**
  - **Focus the organization: align programs and investments**
  - **Integrate cross-functionally**
  - **Educate and empower the organization**

- **The dynamics of the senior executive team will determine whether the Balanced Scorecard becomes a strategic management system**

# Key Pitfalls to Avoid

| *Process* | *Philosophy* |
|---|---|

**Process**

- **Middle management task force**
- **Not driven by senior executive team**
- **Only one or a few individuals involved**
- **Too long a development process (allowing the "best" to be the enemy of the "good")**
- **Delay introduction because of missing measurements**
- **Static not dynamic process**
- **Treating the BSC as an EIS**

**Philosophy**

- **Measurement to control; not to communicate**
- **Management dictating actions vs. employee improvisation to achieve desired outcomes**
- **For management only, not shared with all employees**
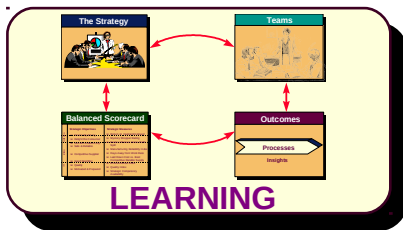
# THE BALANCED SCORECARD MANAGEMENT SYSTEM

*Significant results can be achieved in relatively short periods of time...*


**ALIGNMENT**

**Implement a framework to align and focus the organization from top to bottom on its strategy**


**LEVERAGE**
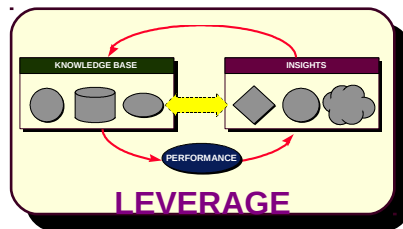
**Identify the related key change initiatives required to realize the strategy and mobilize the organization**


**LEARNING**

**Create feedback processes at all levels to evaluate progress against strategy, monitor and manage issues and priorities, and measure performance and contribution to the business.**

# Balanced Scorecard References

Book: *The Balanced Scorecard: Measures that Drive Performance*

HBR Articles (Jan-Feb. '92; Sept-Oct '93; Jan-Feb '96)

Cases: (Mobil, Chemical Bank, Charlotte, Citibank, Wells Fargo)

Videos: Measuring Corporate Performance

CD-ROM Simulation: "Balancing Your Corporate Scorecard"

- Phone: (800) 668-6780 or (617) 496-1449
- Fax:     (617) 495-6985
- Internet:     www.hbsp.harvard.edu

# For Further Information

## *Visit Our Website*



**www.bscol.com**
**Tel: (USA) 781.259.3737**

**Our Mission:**

*"To facilitate the worldwide awareness, use, enhancement and integrity of the Balanced Scorecard as a value-added management process"*

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*Publications*      *Research*      *Training*

*Conferences*      *Networking*      *Implementation*

# Information System Resources

Resource-

- A **resource** is a source or supply from which benefit is produced

- Typically resources are materials, money, services, staff, or other assets that are transformed to produce benefit and in the process may be consumed or made unavailable.

-

- Benefits of resource utilization may include
  - increased wealth,
  - meeting needs or wants,
  - proper functioning of a system,
  - or enhanced well being.
  - From a human perspective a natural resource is anything obtained from the environment to satisfy human needs and wants.
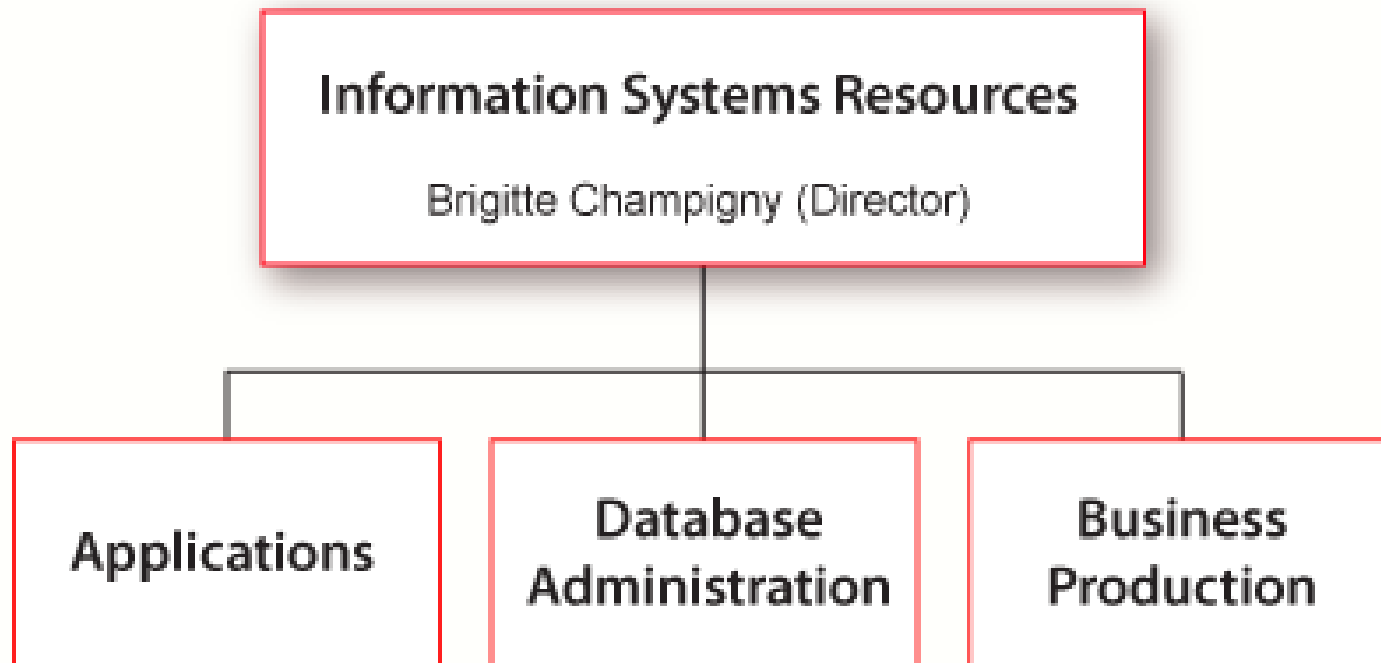
# ISR contd…

- **Information Systems Resources (ISR)** enables the use of information systems in administrative functions so that those functions may be conducted in the most effective way possible.

Overall mission is to:

- Promote, enable, and participate in the incorporation of information systems into administrative functions;
- Facilitate access, use, exchange and management of administrative information resources;

# ISR contd…

- Provide and operate an information systems infrastructure and service;
- Supply systems development and systems management expertise;
- Facilitate and promote information systems development in departments through specification of architectures, standards and development of local expertise.
- Information Systems Resources are Networks, Hardware, Software, Data & People