Designing the Lean Enterprise Performance Measurement System

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Agenda

- Metrics Team Challenge from LAI Executive Board
- Metrics and Lean Transformation
- Research Objective
- Theory and current practices
- Gaps in current practices
- Conceptual Lean Enterprise Performance Measurement System
- Data Collection and Analysis

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Challenge & Guidance from LAI Executive Board (Dec. 2003)

- **Challenge –** Research and Propose System of Metrics for Lean Enterprise Transformation
- **Guidance from Executive Board**
  - Investigate and develop high-level metrics to measure lean progress in government and industry
  - "Fewer metrics is better" approach and philosophy
  - Executive Committee tasked to "pilot" a set of measures and vet a final approach

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System of Metrics for Lean Transformation

Knowledge and Behavior

New enterprise capability

Integration of processes/methods & tools supporting transformation across the value stream enabling new enterprise capabilities

New local behavior

Shift in thinking and behavior

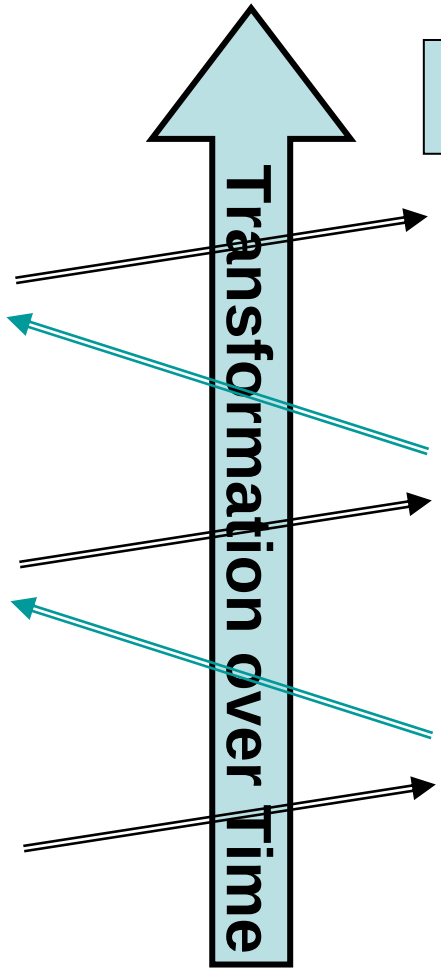
New routines and ways of doing business

Organization and group culture change

New approaches (training and introduction of new methods)

Engagement in "LAI-venue" with like-minded people

Enterprise simulation, Lean Now and LAI knowledge area teams



Metrics and Assessments

Enterprise impact and results

Industry — **ROIC**

Government — **ORPIC**

Local results and visible indicators

Industry **Government**

Cycle time, quality, WIP, on-time delivery, customer satisfaction, employee turnover and attitude, organizational climate and LESAT maturity

Local efforts and new capabilities

Industry **Government**

Skills, training hours, certification, lean deployment, joint assessments and efforts

ROIC = Return on Invested Capital
ORPIC* = Operational Readiness per Invested Capital

Adapted from : Noel Nightingale, 2004

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Research Objective

- **Identify and empirically test the relationship among business, financial, operational, organizational and leadership metrics that correlate with and predict lean improvement and change at an enterprise level.**

- **Validate the relationships among various metrics of business process and lean improvement to develop better performance measurement system for lean enterprises.**

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Role of Performance Measurement

- **Monitoring**
  - **Measuring and recording actual performance**
- **Control**
  - **Identifying and attempt to close the gap between planned target and actual performance**
- **Improvement**
  - **Identify critical improvement opportunities**
- **Coordination**
  - **Information for decision making – Leading Indicators**
  - **Internal communication across processes**
  - **External communication with stakeholders**
- **Motivation**
  - **Align Behavior and encourage transformation**

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Performance Measurement Frameworks

- **Balanced Score Card and Strategy Maps *(Kaplan and Norton)***
- **EFQM - European Foundation for Quality Management**
- **SMART - Strategic Measurement Analysis and Reporting Technique system *(Wang Laboratories, Inc)***
- **Feed Forward, Feedback control Model *(Fitzgerald et al.)***
- **PMQ - Performance Measurement Questionnaire *(Dixon et al.)***

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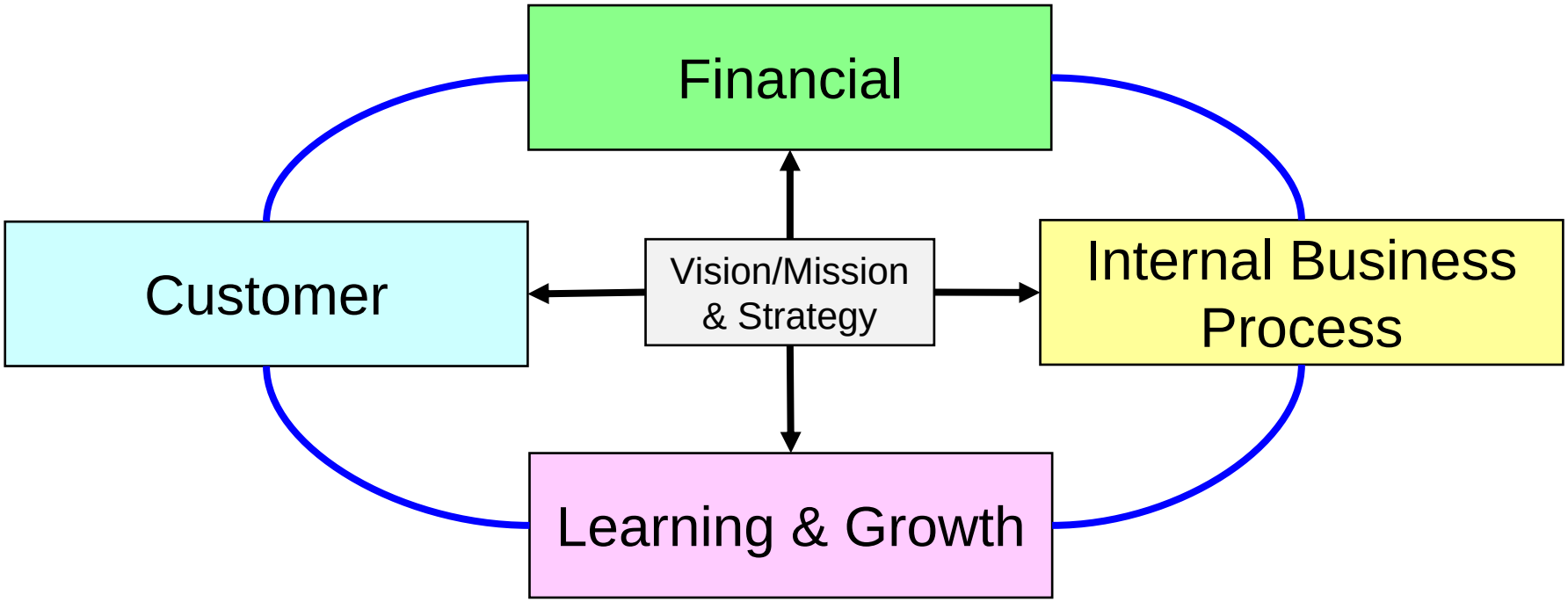
Basic Design of a Balanced Scorecard



Adapted from : Kaplan and Norton, “Linking the Balanced Score Card to strategy” California Management Review, March 1996

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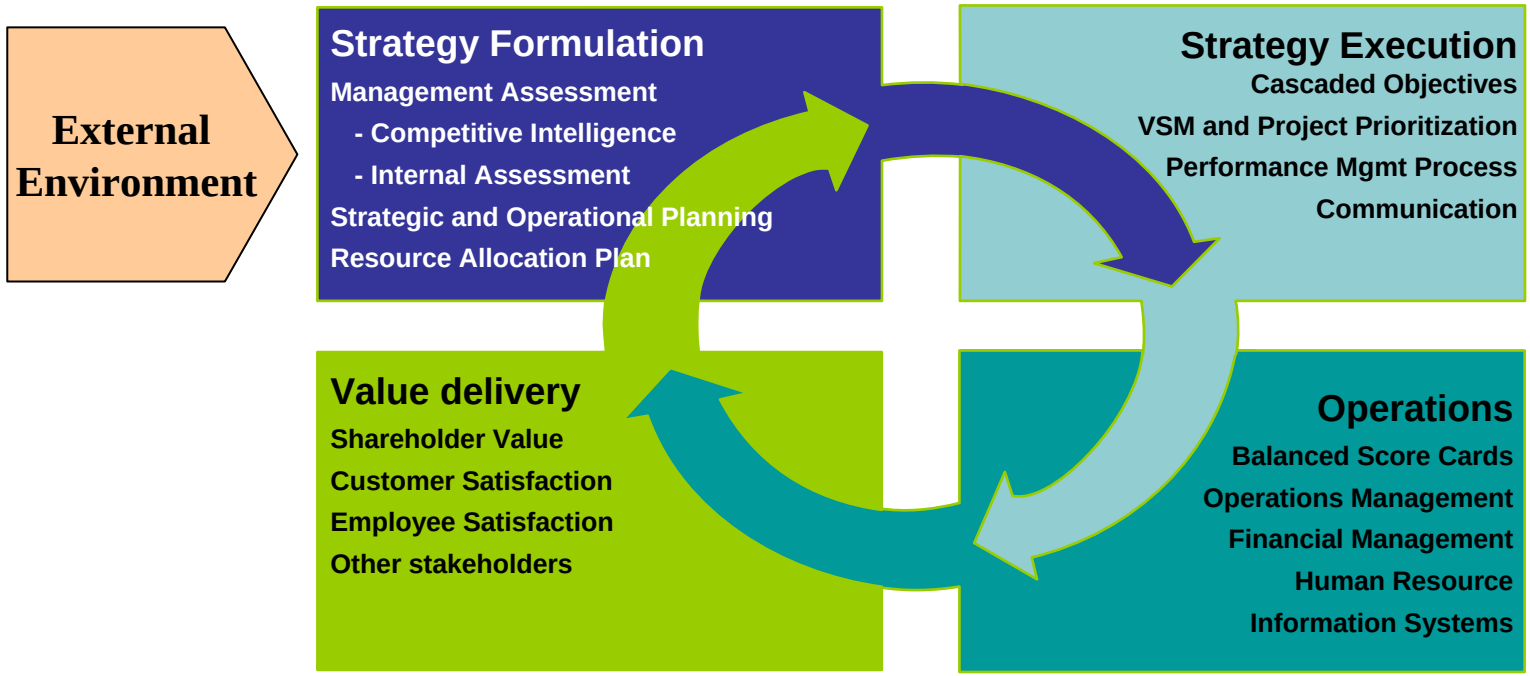
Generic Enterprise Management Process



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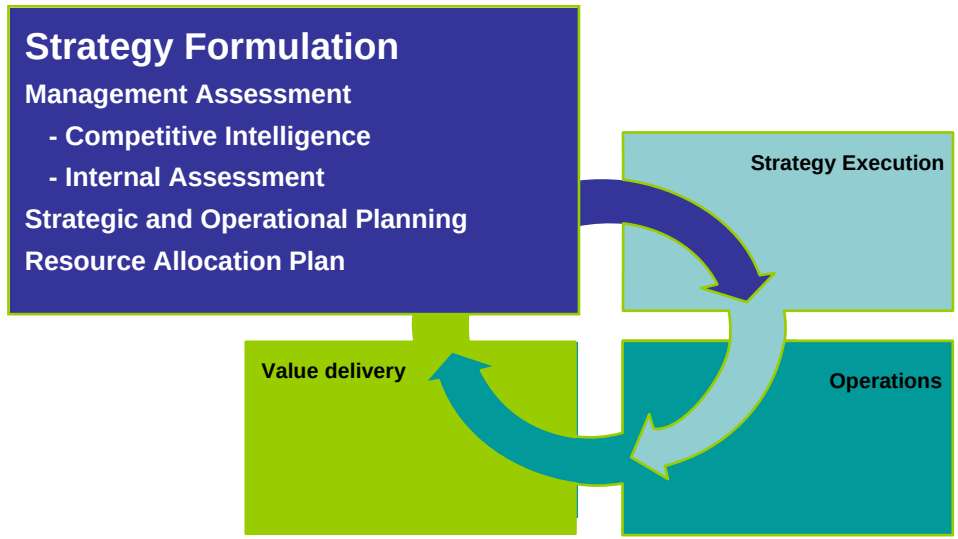
Strategic Metrics

- ROIC (Return on Invested Capital)
- Economic Value Add (EVA)
- Net Operating Profit
- Inventory Turnover
- Revenue
- Cash flow
- Market Position
- Wall Street Expectations



Efficiency metrics and
Lagging indicators

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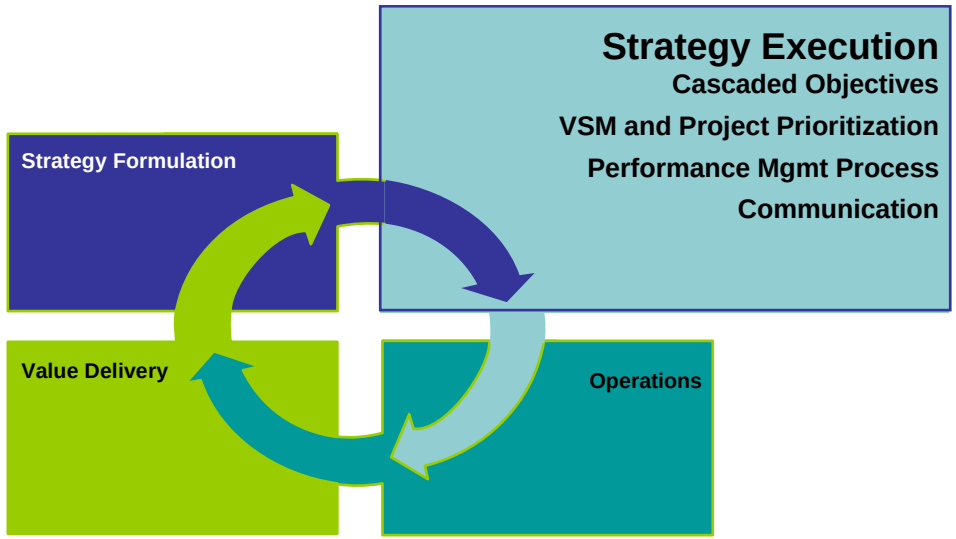
Operational Metrics

- Financial Turnover
- Budget/Cost and Expenses
- Cost of quality
- Productivity
- Supply Chain Excellence
- Regulatory and social compliance
- Accuracy and timeliness of reporting and control



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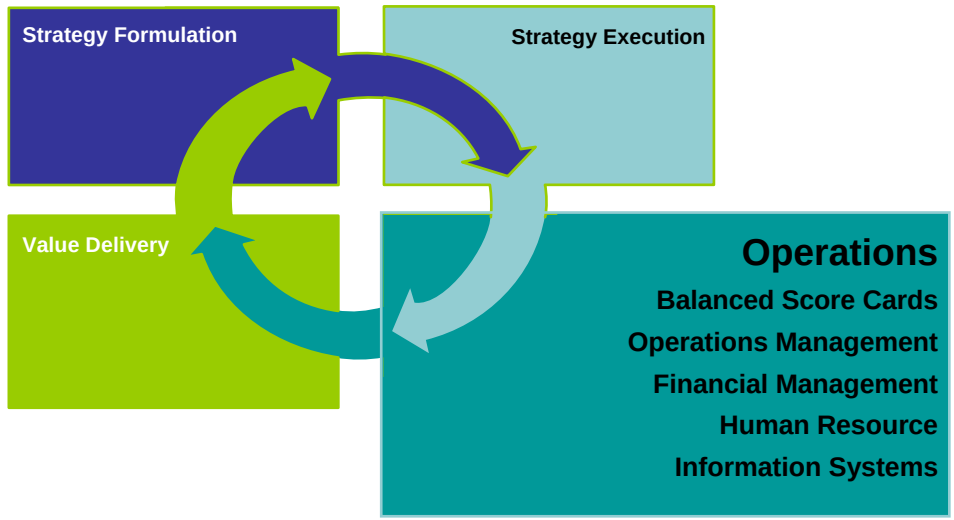
Tactical Metrics

- Safety
- Quality
- Environment
- Cost/Manufacturing Efficiency
- Delivery
- Time to market
- Education and development
- Time to Hire



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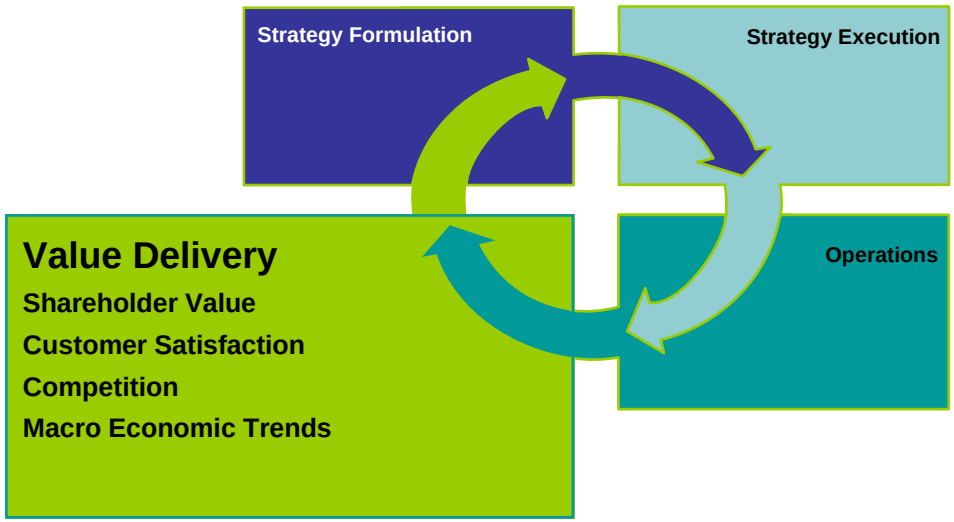
Value Delivery Metrics

- Stock Price
- Revenue
- On time delivery
- Customer satisfaction and loyalty
- Employee Satisfaction
- New product Introduction



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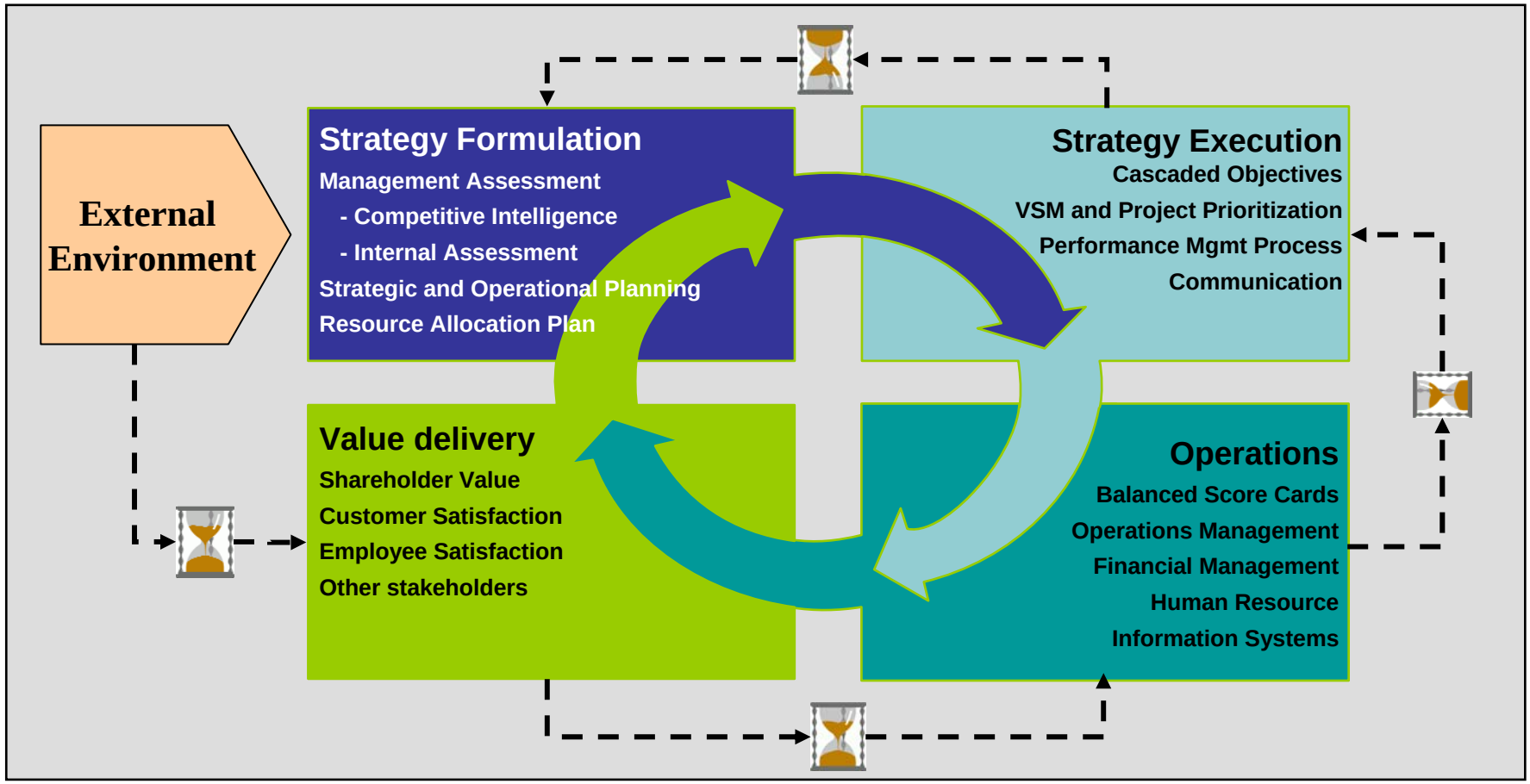
Performance Management Process



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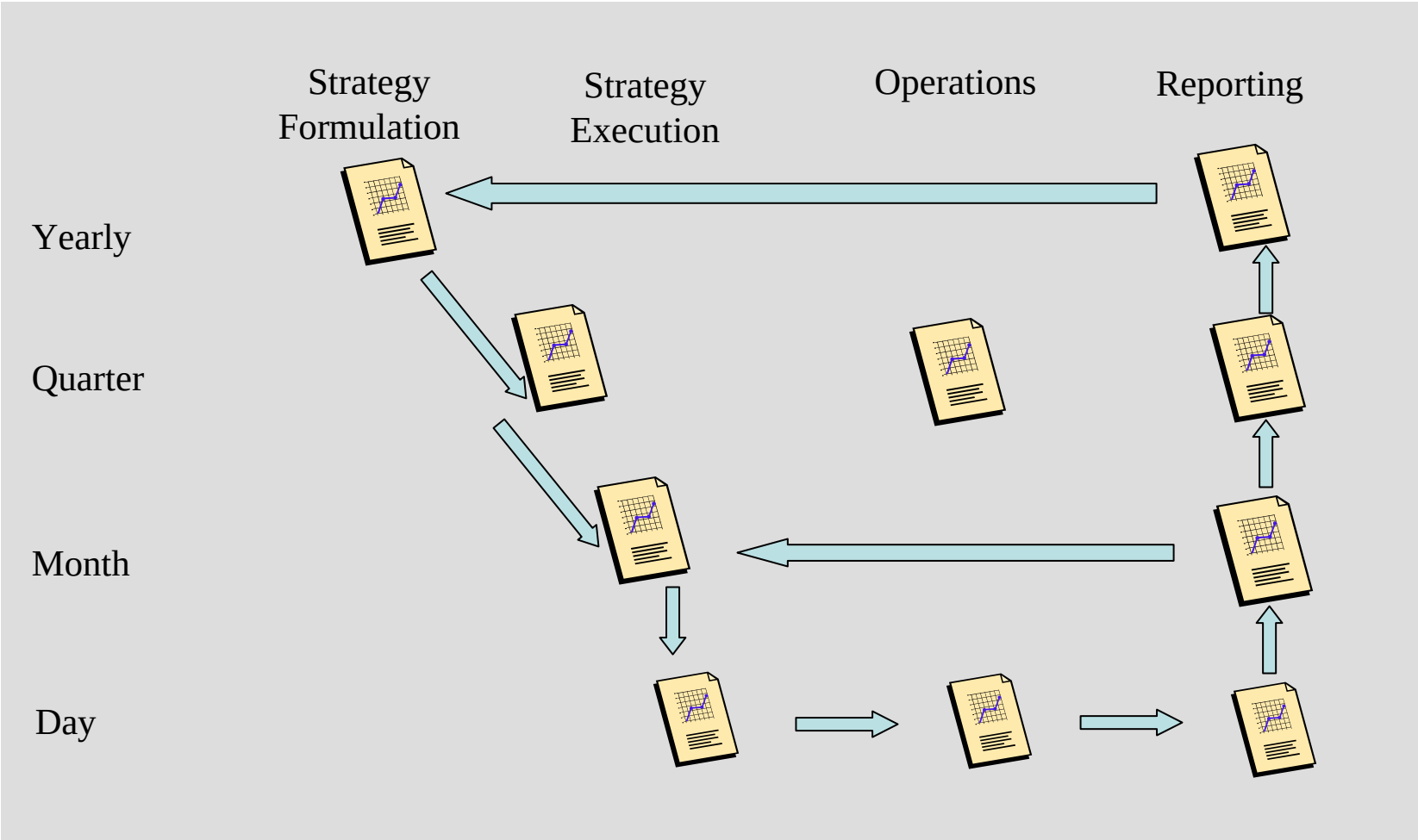
Performance Management Process



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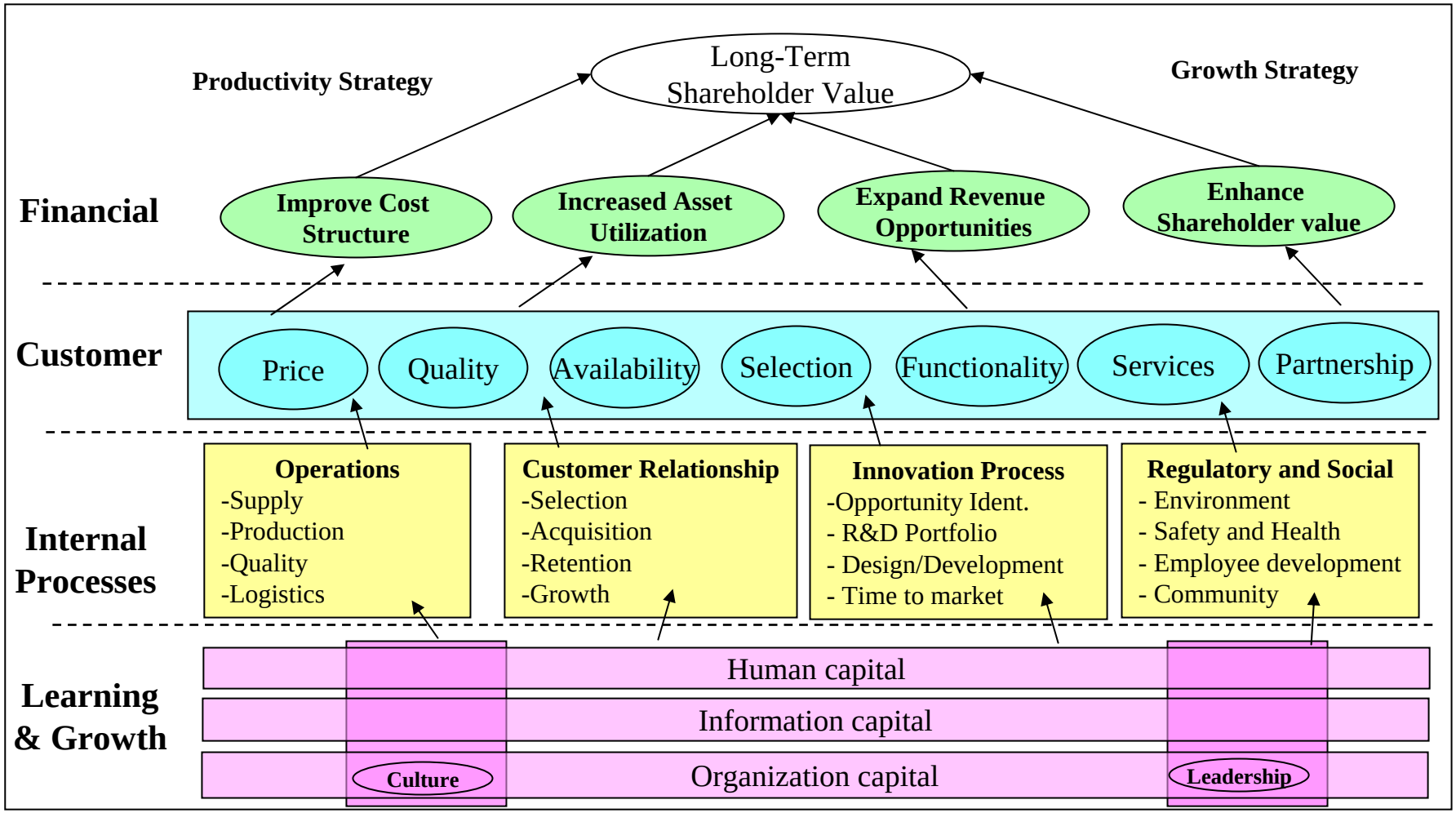
Balanced Scorecard/Strategy Map



Adapted from : Kaplan and Norton, (2000) "Having Trouble with your strategy? Then Map it!" Harvard Business Review Sept_Oct 2000

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What are companies doing?

- Heavy reliance on management intuition
- Fixation on the “four buckets” of the balanced scorecard
- Consultant Driven quagmire of measurement frameworks, models, and laundry lists of measures
- Measurement overload to avoid missing anything important
- Disconnect between efficiency and effectiveness measures

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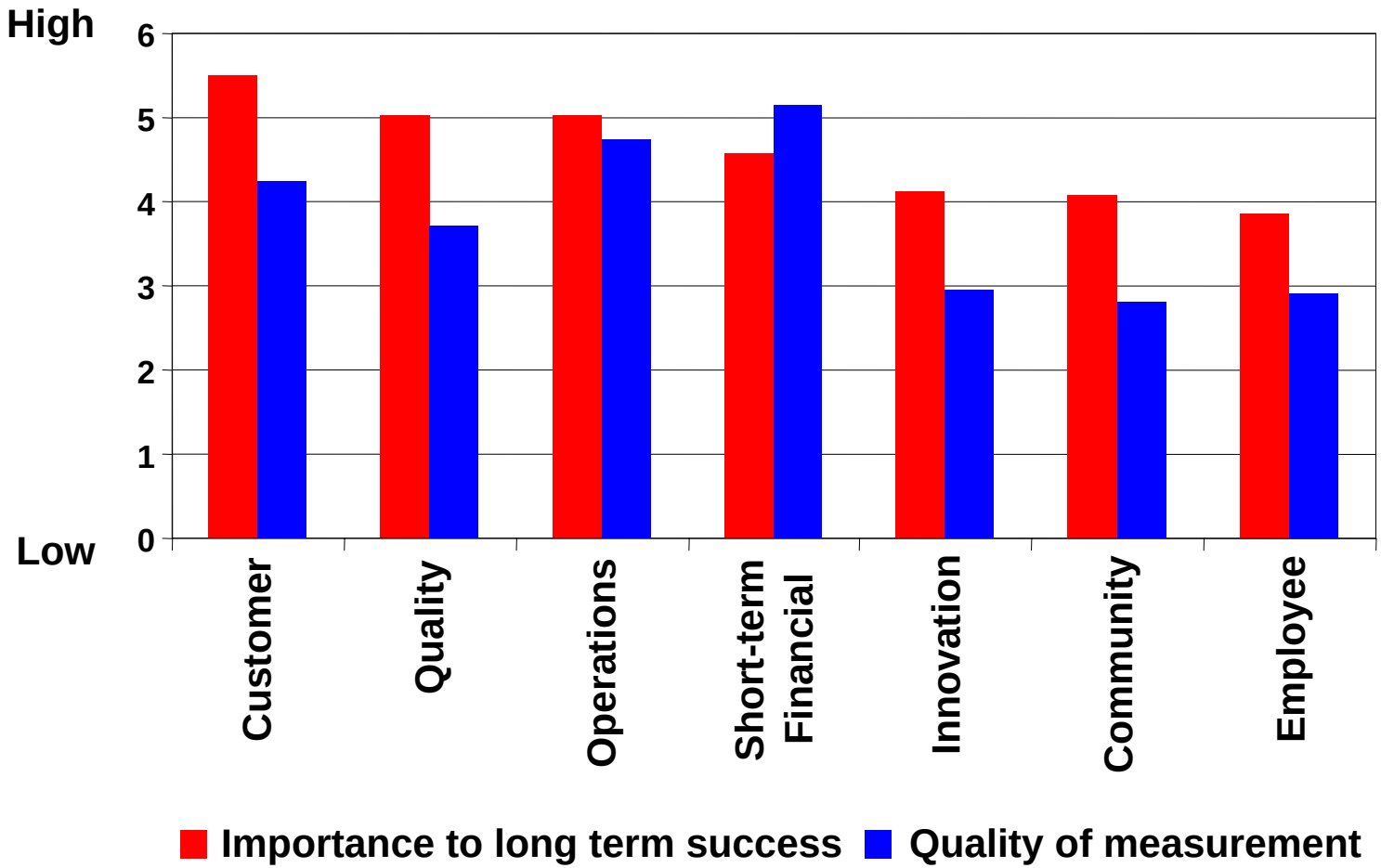
Gaps Between Drivers and Measures



Source: Larker, 'Performance Measurement Insights and Challenges', Management Accounting Research Group Conference, March 2004

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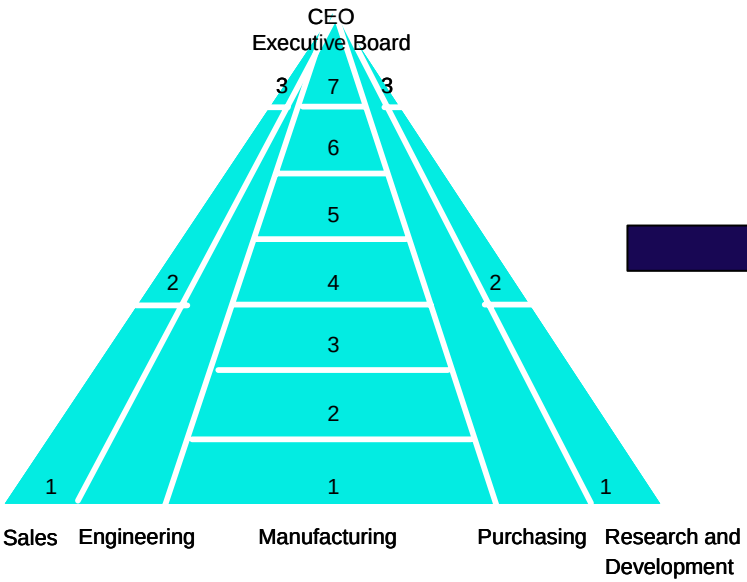
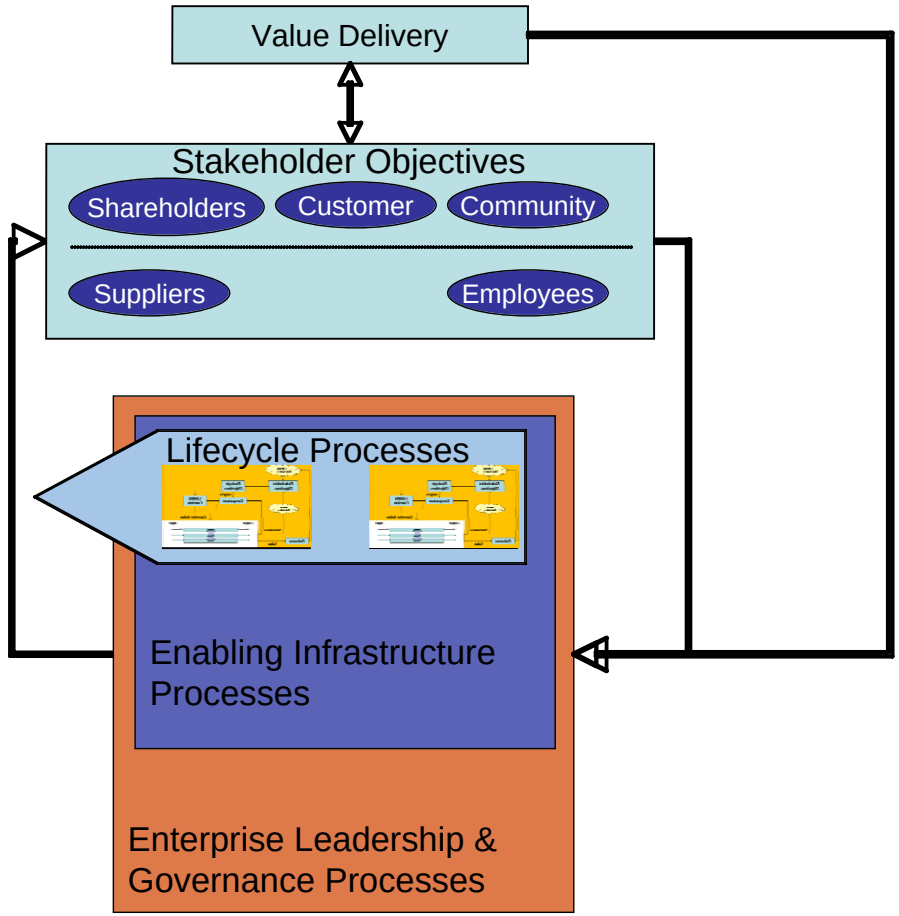
Enterprise Transformation

Functional Enterprise



Lean Enterprise



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Gaps in Performance Measurement Systems

- Does not address value delivery for all the stakeholders.
- Causal relationship between the metrics and actions is not understood.
- Time lag between the actions and outcomes is not captured.
- Bottom-up reporting structure does not always translate to actionable feedback loop.
- Fosters local optimization instead of system level optimization
- The systems are static and therefore cannot adapt to changing critical areas of success and do not incorporate measurements for continuous improvement.

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Desired Characteristics of Performance Measurement Systems

- Performance Measures should support the strategic intentions of the organizations
- Managers at all levels should understand both drivers and results of their activities.
- Explicating Cause-Effect relationships between drivers and results

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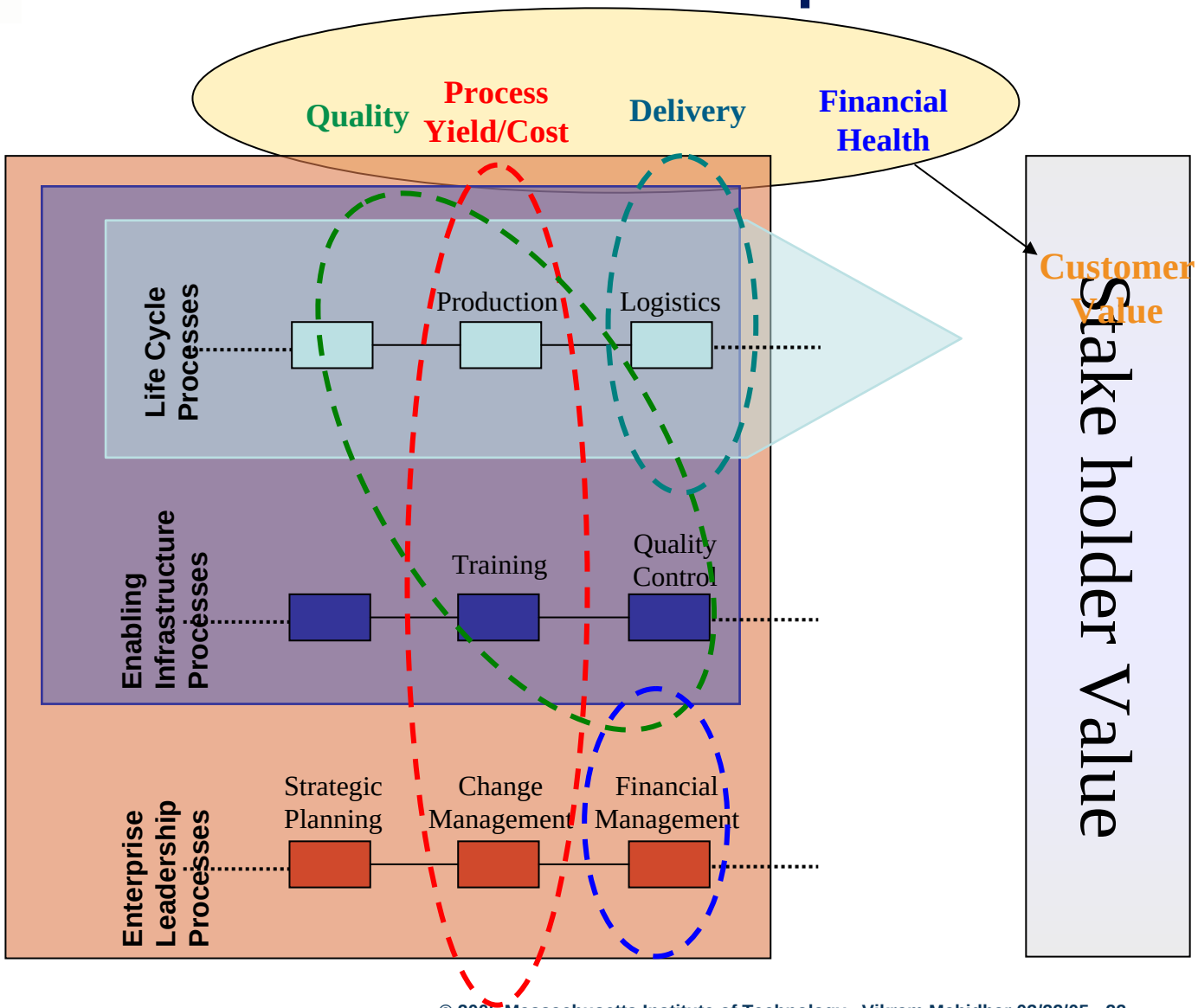
Lean Enterprise Metric Interdependencies



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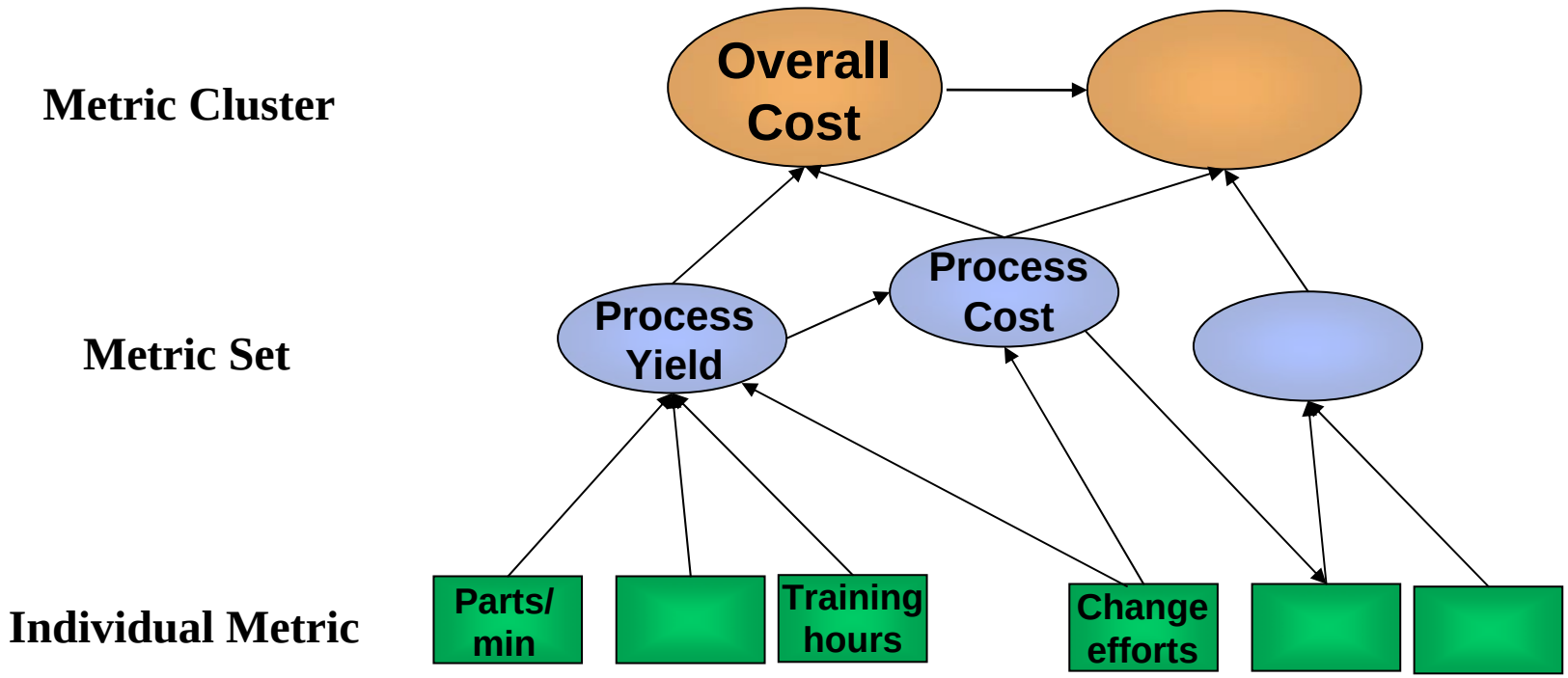
Understanding Performance Measurement Structures



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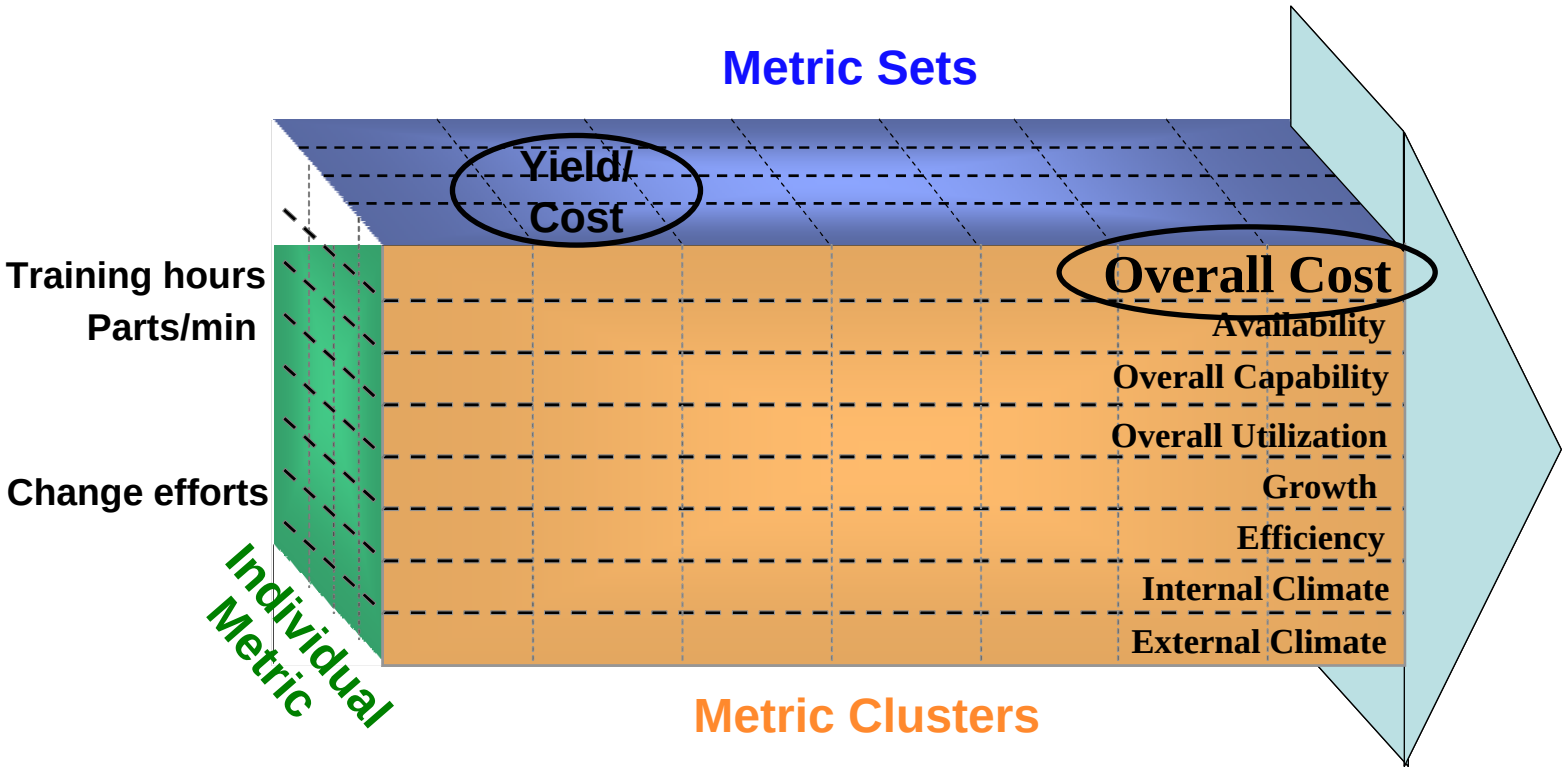
Performance Measurement System across the Enterprise Value Stream



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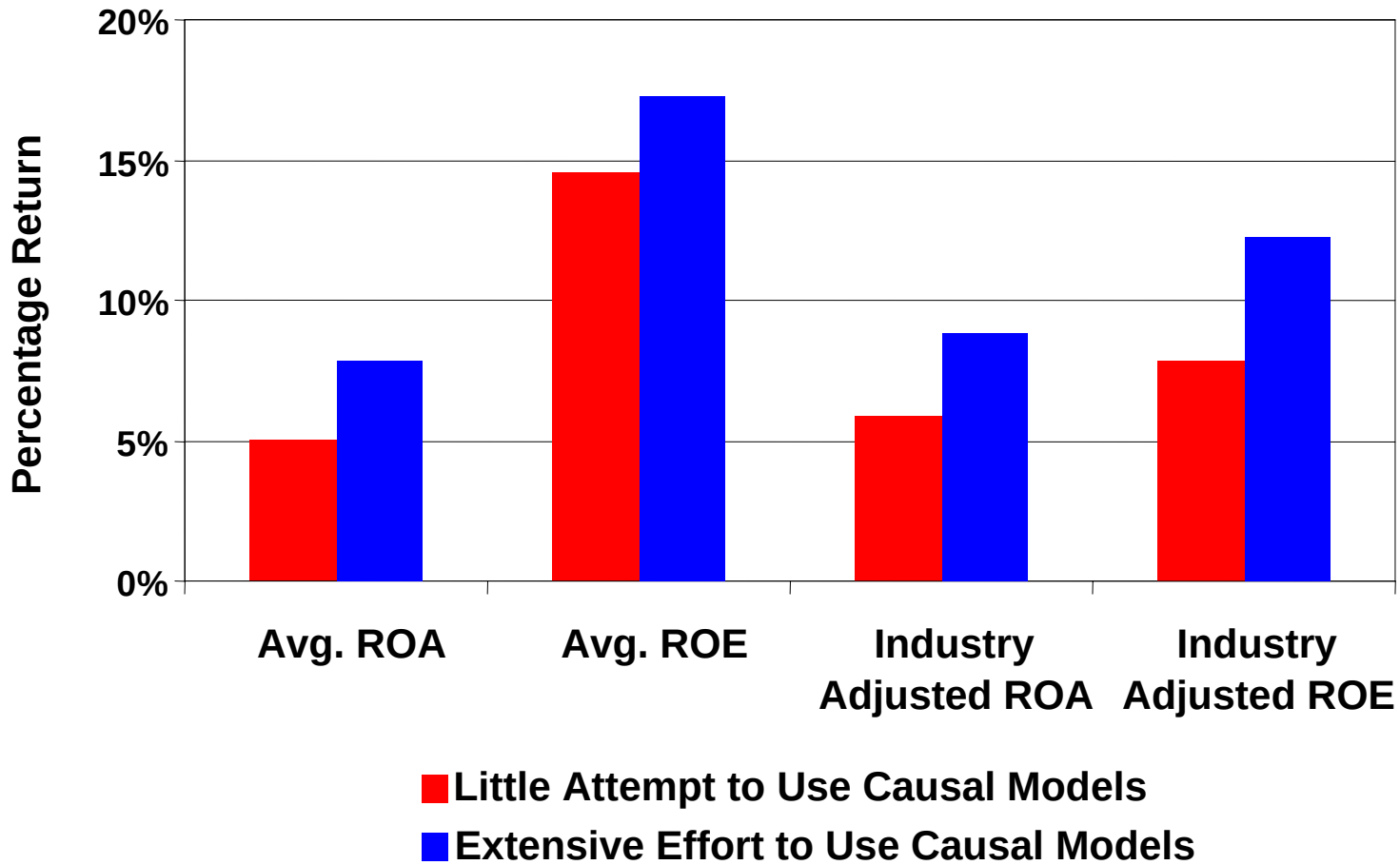
Financial Benefits of Using Causal Models



Source: Larker, 'Performance Measurement Insights and Challenges', Management Accounting Research Group Conference, March 2004

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Data Collection and Analysis

- **Quantitative data:**
  - **Time series performance data across the functions and processes.**
  - **Definition of metrics and assumed relationships using metric record sheet.**
- **Qualitative Data:**
  - **Data on Change and improvement programs**
  - **Time series data on culture and leadership via a questionnaire**
- **Analysis:**
  - **Factor analysis to empirically develop metric clusters.**
  - **System dynamic modeling to understand the relationships.**
  - **Structural equation modeling to understand the impact of current performance measures on the enterprise level goals.**

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Expected Results

- Factors influencing rate of progress in lean transformation.
- Set of metrics that provide comparison across facilities and within companies against broader averages.
- Performance Measurement System that captures causal relationship.

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Questions

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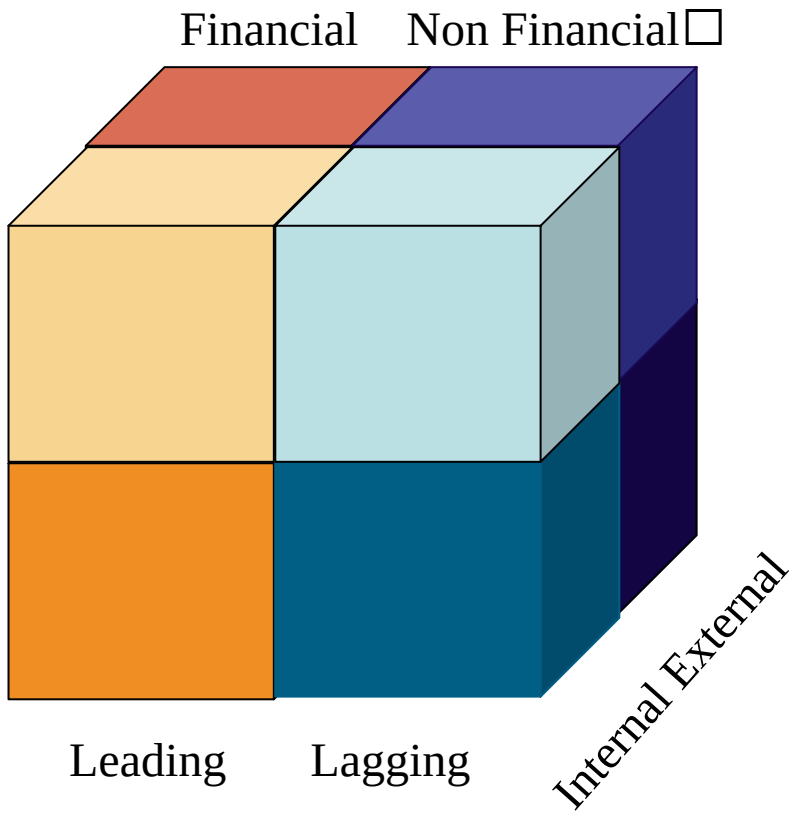
Dimensions of Metric

- **Scope of Measurement**
  - **Internal**
  - **External**
- **Time horizon**
  - **Leading**
  - **Lagging**
- **Type**
  - **Financial**
  - **Non-Financial**



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