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This preview shows selected pages that are representative of the entire course book; pages are not consecutive. The page numbers shown at the bottom of each page indicate their actual position in the course book. All table-of-contents pages are included to illustrate all of the topics covered by the course.

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TDWI Design Techniques for Dashboards and Scorecards

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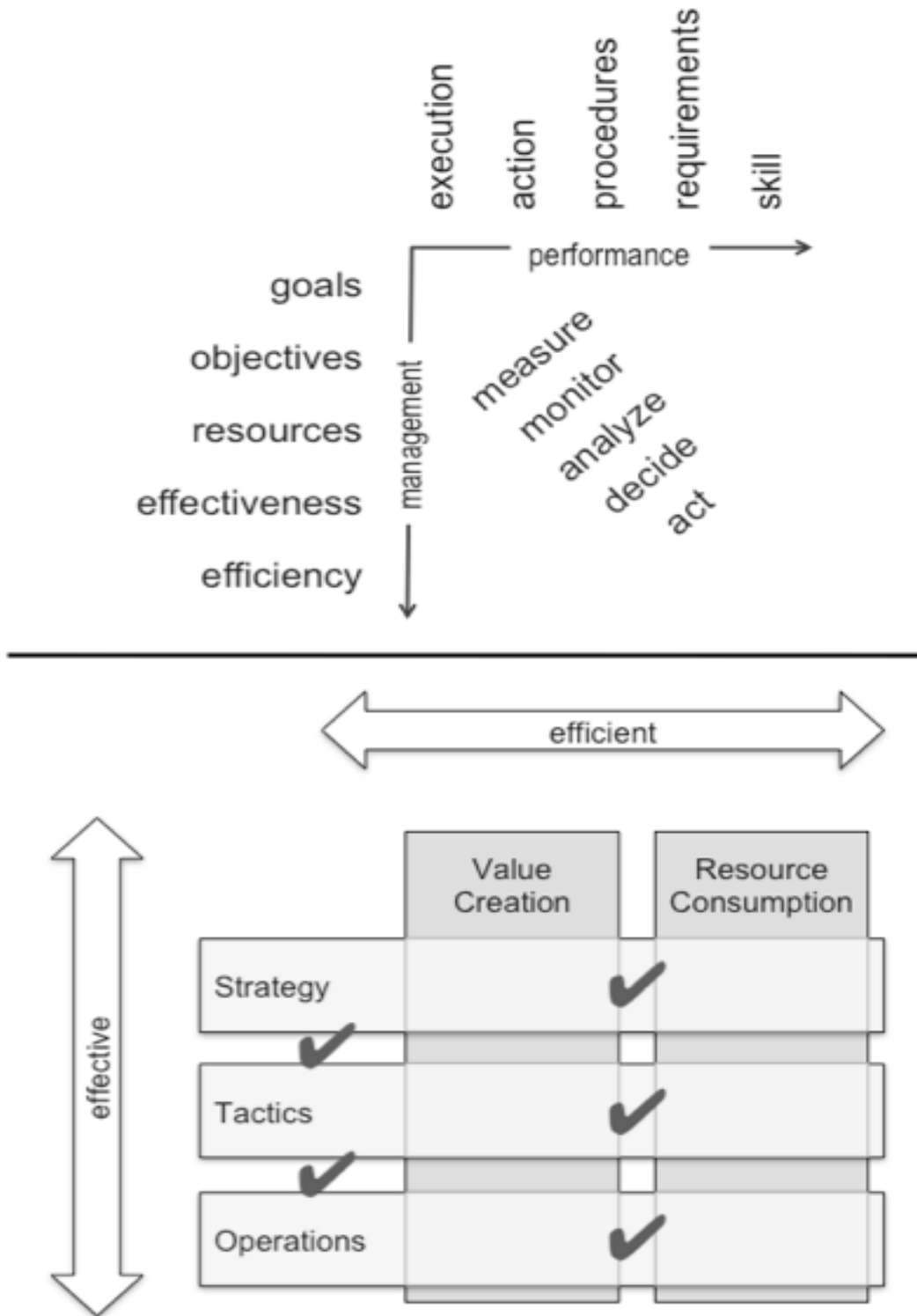
Module 1

Dashboards and Scorecards – What and Why

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Definitions

Performance Management



Definitions

Performance Management

LOOKING AT THE WORDS: PERFORMANCE AND MANAGEMENT

Merriam -Webster online says performance is “execution of an action; the fulfillment of a claim, promise or request ... to perform implies action that follows established patterns or procedures or fulfills agreed-upon requirements and often connotes special skill.” Wikipedia defines management as “the act of getting people together to accomplish desired goals and objectives using available resources efficiently and effectively.”

Combining the key elements of performance – execution, action, procedures, requirements, and skills – with the key concepts of management – goals, objectives, resources, efficiency, and effectiveness – begins to provide some shape and structure to the processes of performance management. At the intersection of performance and management we need processes to measure and monitor performance, analyze the measures, decide what to do, and take action.

PM DEFINED

Gary Cokins defines performance management concisely as “translation of plans into results – execution ... the process of managing ... strategy”¹ Wayne Eckerson says performance management “consists of a series of processes and applications designed to optimize the execution of business strategy ... a framework that takes the long-standing task of *measuring performance* to the next level, that of *managing performance*.”² Frank Buytendijk states “Performance management tries to capture an organization’s business model ... how various business domains affect the business results.”³

PM GOALS – EFFECTIVE AND EFFICIENT

Strategy defines a company’s future position as a set of goals and the methods by which they plan to achieve those goals. Tactics are the means by which strategy is carried out – the work of implementing strategy. Business operations are the day-to-day activities and the end-to-end business processes that carry out the work of the business.

Effectiveness is the degree to which strategy is realized as action in business operations. Two translations directly influence effectiveness: translating strategy to tactics, and translating tactics to operations.

Every business process creates value and consumes resources. Efficiency is the balance of value created and resources consumed.

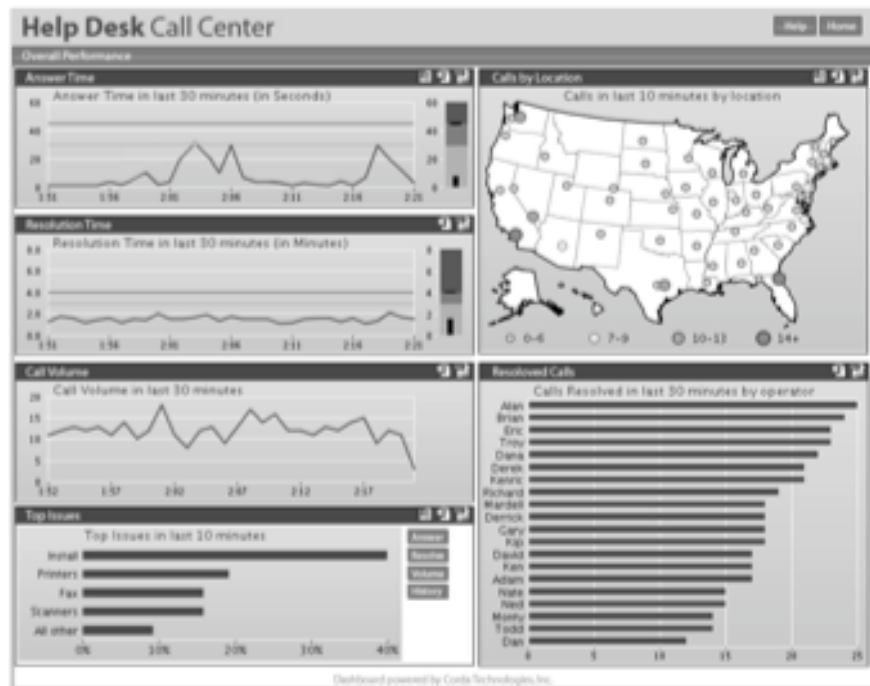
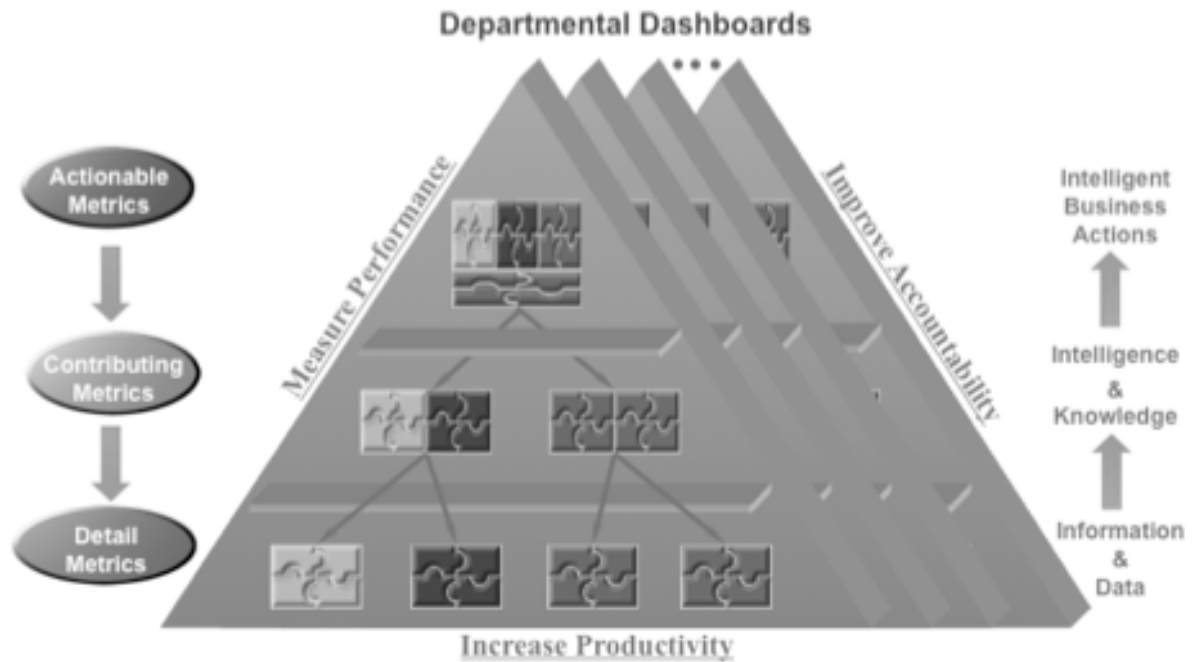
¹ *Performance Management*, pp. 9, Cokins

² *Performance Dashboards, Second Edition*, pp. 11, Eckerson

³ *Performance Leadership*, pp. 17, Buytendijk

Using Dashboards

Example: Cisco Systems



Using Dashboards

Example: Cisco Systems

MAD FRAMEWORK IMPLEMENTATION

Cisco Systems' BI Framework is an implementation of the MAD framework. Cisco has deployed in marketing, HR, and finance, and continues to grow and evolve. For each departmental dashboard, approximately 10 metrics at the top level cascade to about 100 metrics at the middle level (mostly different dimensional views of the top level metrics), which further expand to around 1,000 metrics for reporting at the bottom layer.

TOP LEVEL VISUAL WITH DRILL-DOWN

One example of the top level is shown on the facing page. For call center management, six key performance indicators are shown graphically:

- Answer time in the last 30 minutes
- Resolution time in the last 30 minutes
- Call volume in the last 30 minutes
- Top issues in the last 10 minutes
- Calls by location in the last 10 minutes
- Calls resolved in the last 30 minutes by operator

With a simple click, each performance indicator can be drilled into for analysis and reporting.

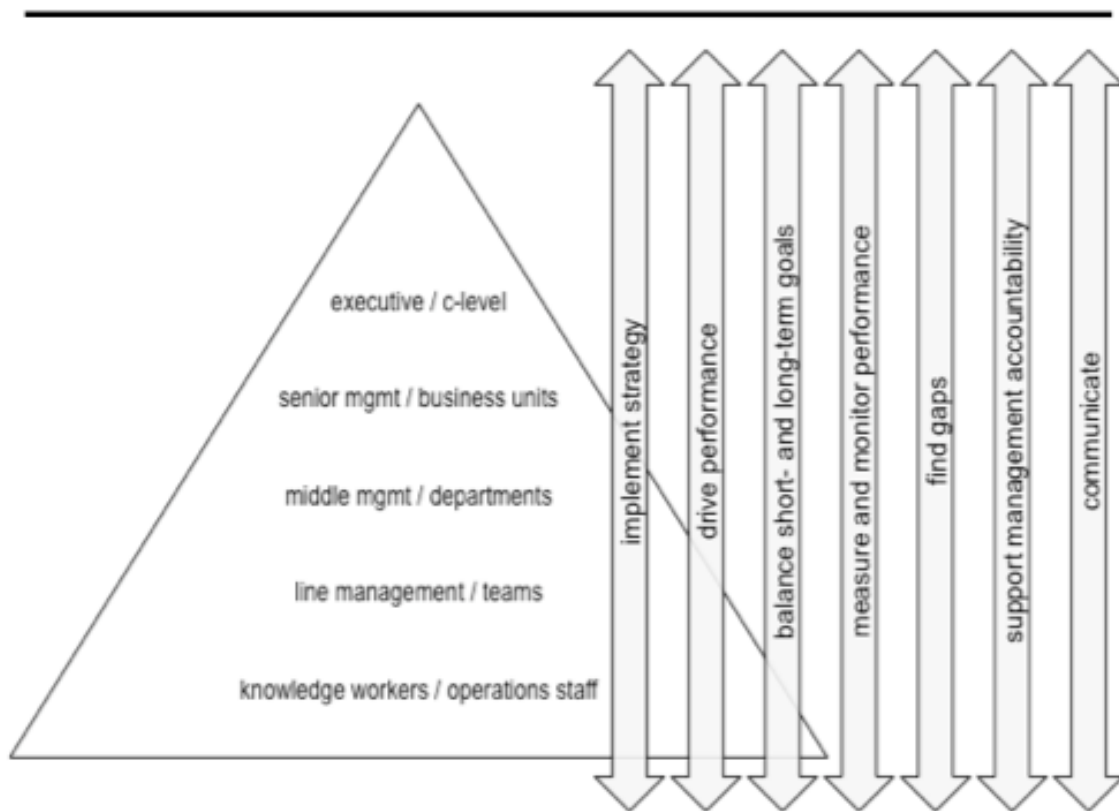
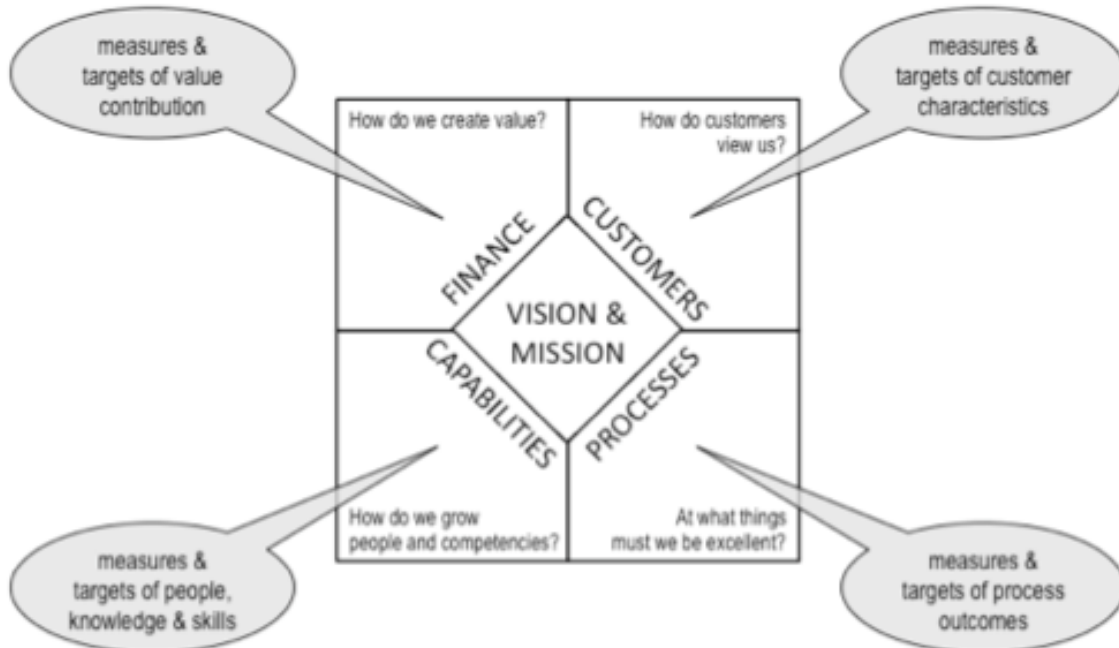
SIZE, SCOPE, AND EASE OF USE

Each departmental dashboard focuses on a specific domain (e.g., finance, sales, HR) and contains about 20 dimensions and 10 to 12 top-level metrics. The top level cascades via predefined dimensional filters into 1,000+ metrics or views. The size and scope are big enough to quickly find answers to most questions but not so large that the tool becomes intimidating or difficult to use.

When a dashboard user navigates to a particularly useful view of information they can subscribe to the view, making it readily available with fresh data each time they view the dashboard.

Using Scorecards

Who, When, and Why?



Using Scorecards

Who, When, and Why?

THE BALANCED SCORECARD

Many businesses have adopted a Balanced Scorecard (BSC) approach to performance management, which is founded on the principle that financial performance is driven by customers, customer performance by internal processes, and process performance by organizational competencies. Performance management depends on measurement, and many of the measures are financial. But financial measures alone have little impact on business performance. The BSC approach seeks a balanced collection of metrics for finance, customer, process, and capabilities.

PERFORMANCE “LINE OF SIGHT”

When performance scorecards are deployed throughout a business from executives to knowledge workers, it becomes possible to see business performance connections from top to bottom in the organization. A “line-of-sight” view from strategy to operations helps to align business efforts both vertically and horizontally.

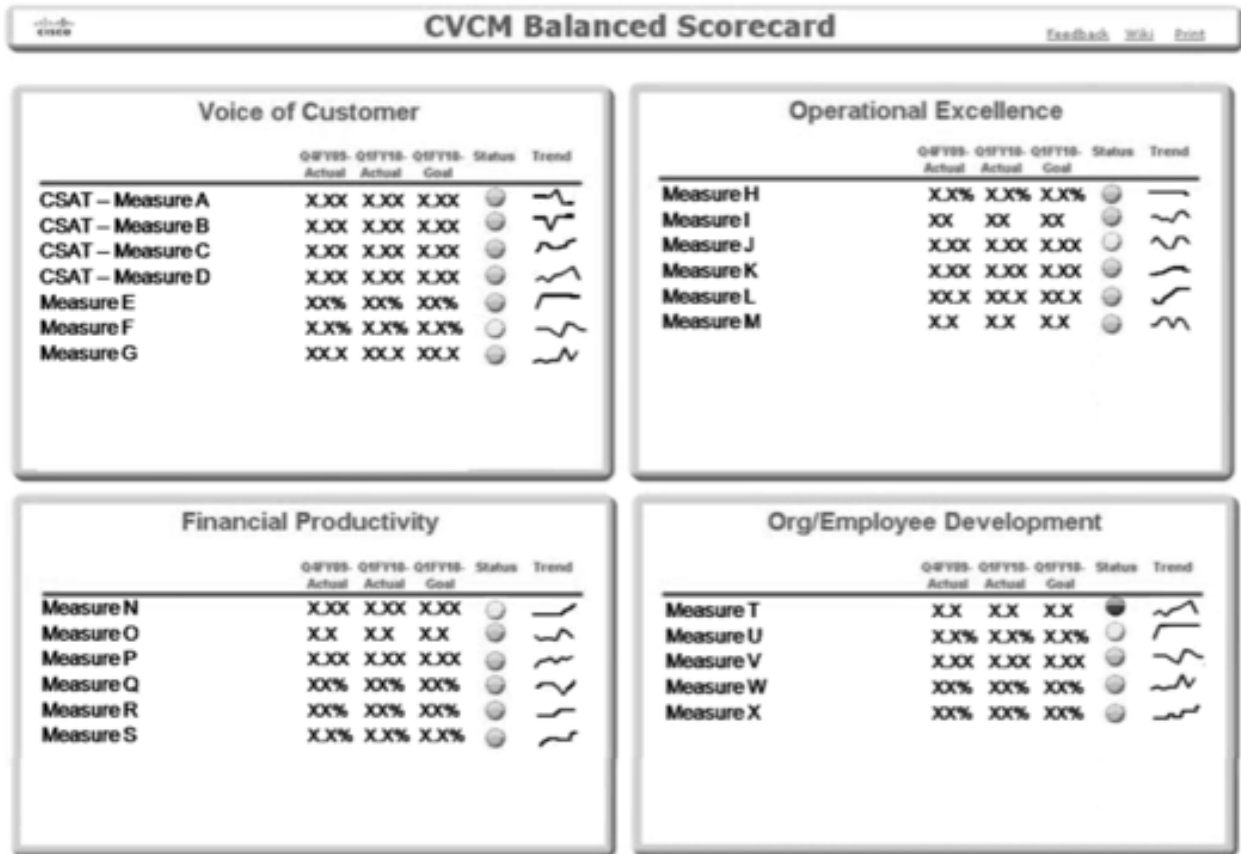
APPLIED SCORECARDS

Scorecards are applied to monitor, manage, and improve performance in several ways. They are used to:

- Execute strategy by translating it into concrete terms and measurable objectives that help to track implementation.
- Drive performance by providing feedback to people at all levels about how well they perform and what areas need attention.
- Balance long-term and short-term goals by keeping the right balance of strategic, tactical, and operational indicators in view.
- Measure and monitor performance with a carefully designed and strategically aligned model that measures the right things.
- Find gaps through scorecard design and use. The understanding of cause-effect relationships that is needed to link leading and lagging indicators drives awareness of business dependencies and breaks down stovepipes.
- Support management accountability by enabling performance reviews that are regular, thorough, objective, and based on clearly defined targets.
- Communicate by describing business performance clearly and without ambiguity. Well-developed scorecards tell the whole story of performance – how many complex variables are being balanced, connected, and collectively optimized.

Using Scorecards

Example: Cisco Balanced Scorecard



Using Scorecards

Example: Cisco Balanced Scorecard

FOCUS ON CUSTOMER SATISFACTION

Nearly every functional area at Cisco maintains a balanced scorecard with metrics relevant to its domain. Each fiscal quarter, executives and managers in the functional areas hold a one- or two-day operational review meeting to discuss the results illustrated in the scorecard. The metrics are divided into classic balanced scorecard perspectives, although the names are slightly different: Voice of the Customer, Operational Excellence, Financial Productivity, and Organization/Employee Development.

It is noteworthy that the functional scorecards position the customer as the most prominent perspective. Also note that each metric has two comparators: current fiscal year goal, and prior fiscal year actual value.



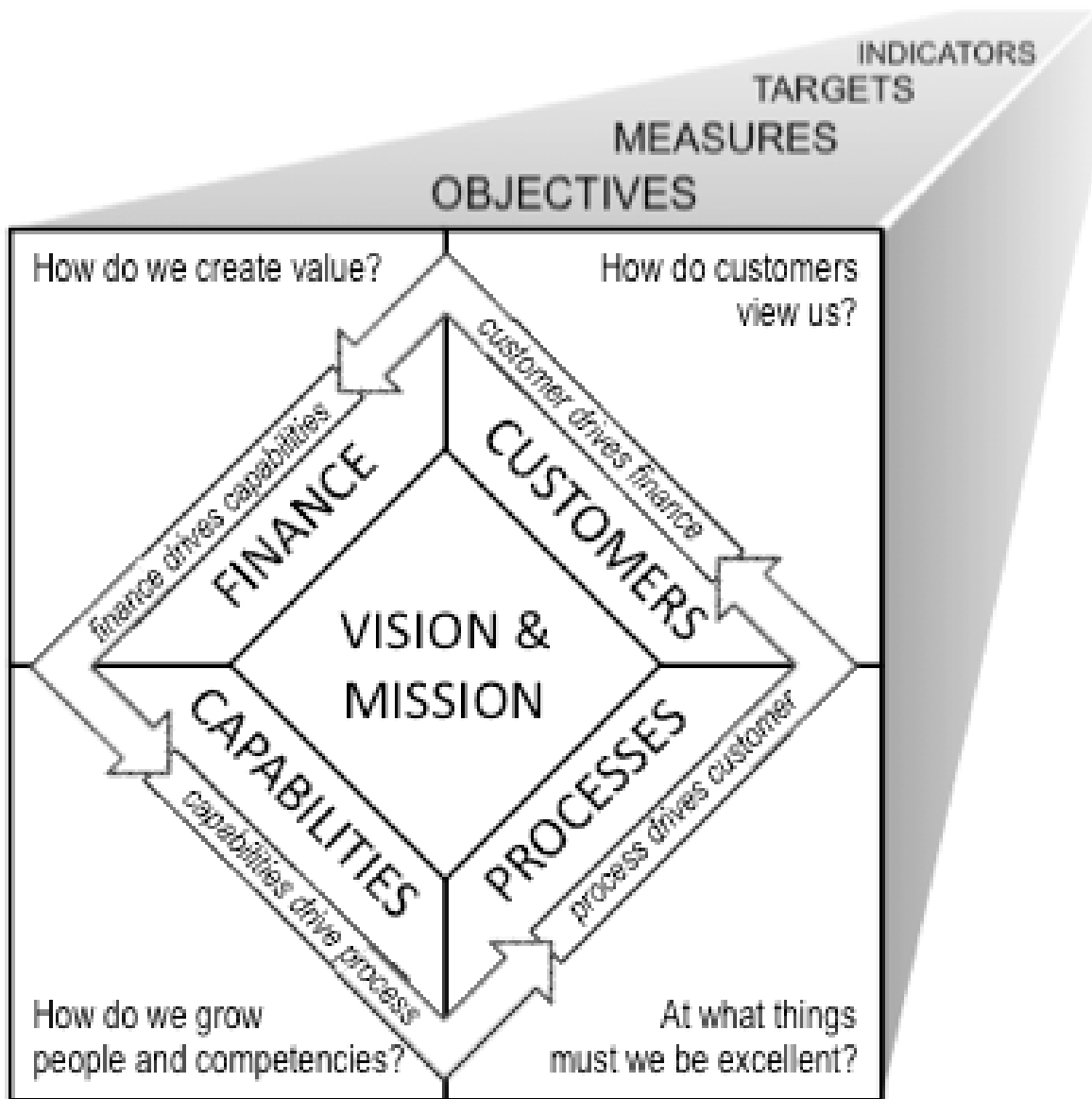
Module 2

Performance Management Architecture

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Business Architecture

Balanced Scorecard



Business Architecture

Balanced Scorecard

STRATEGIC SCORECARD STANDARD

As previously described, the BSC approach is founded on these principles:

- Customer outcomes drive financial performance.
- Internal process excellence drives customer performance.
- Organizational capability (learning and growth) drives process performance.

Robert Kaplan and David Norton (Harvard Business School) first introduced BSC in 1992. Since that time it has evolved substantially and become the de facto standard for strategic business scorecards. The first generation of BSC focused largely on measures and metrics (performance indicators.) The second generation extended to focus on objectives and targets. The third (and current) generation further expanded to focus on how to execute strategy and achieve objectives, introducing the concept of strategy maps.

ADAPTING THE STANDARD

We'll dive deeper into strategy maps shortly. But first let's consider some variations of BSC. The business driver concept described above

capabilities → process → customer → finance

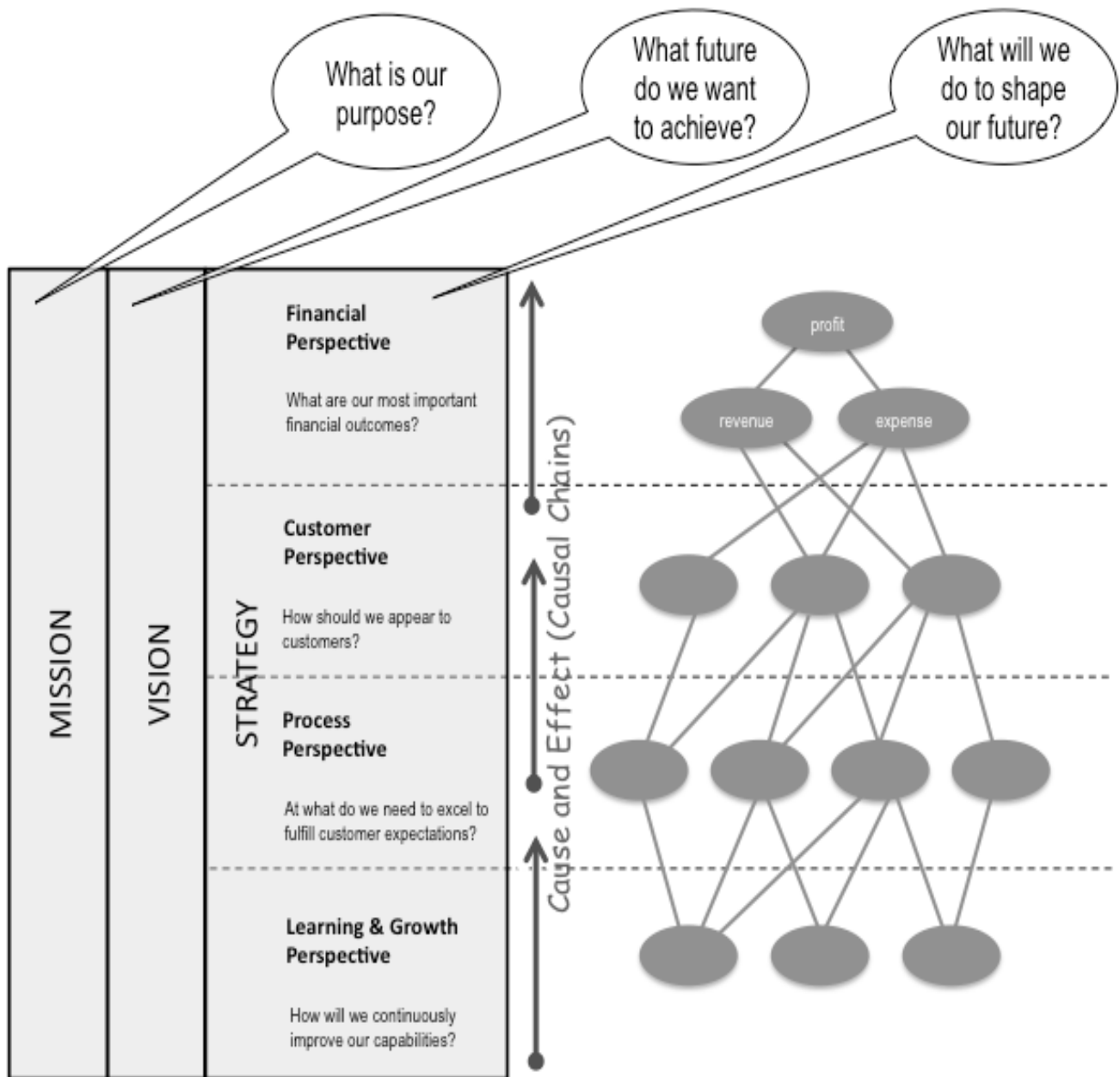
suggests a linear chain of cause and effect with finance at the end of the line. The reality is more of a cause-effect loop where

capabilities → process → customer → finance → capabilities → process ...

in a never-ending cycle of stimulus and response. In fact, finance is only the top-level category of objectives in for-profit enterprises. What about government, non-profit, education, and similar enterprises?

Business Architecture

Strategy Mapping



Business Architecture

Strategy Mapping

VISION AND MISSION

We've not yet discussed the *vision and mission* core at the center of the BSC model. They represent the common element and strongest connection among the scorecard perspectives. Mission describes the purpose of the organization. Vision describes the desired future. Results for each of the perspectives should make meaningful and identifiable contributions to achieving the stated purpose and realizing the desired future.

CAUSE AND EFFECT

The strategy map is a collection of nodes (the bubbles) linked with arrows to illustrate the chains of influence among the nodes. Nodes may represent objectives, critical success factors, and business outcomes. Each node is unique to one of the scorecard perspectives. The same node should not appear in more than one perspective or "sit on the fence" between perspectives.

Business Architecture

Performance Indicators

	A	B	C	D	E	F	G	H	I
1		link to strategy	ability of quantify	drives behavior	actionable	understandable	data availability & condition	common definition	Metric Score
2	Finance								
3	finance metric 1								
4	finance metric 2								
5	finance metric 3								
6	Customer								
7	customer metric 1								
8	customer metric 2								
9	customer metric 3								
10	Process								
11	process metric 1								
12	process metric 2								
13	process metric 3								
14	Capabilities								
15	capabilities metric 1								
16	capabilities metric 2								
17	capabilities metric 3								
18									

Rate each metric on a 1-5 scale where 5 = very closely meets requirement
 (adapted from the work of Karen Degner, BPM Paradigms LLC)

Business Architecture

Performance Indicators

QUALIFYING KPIS

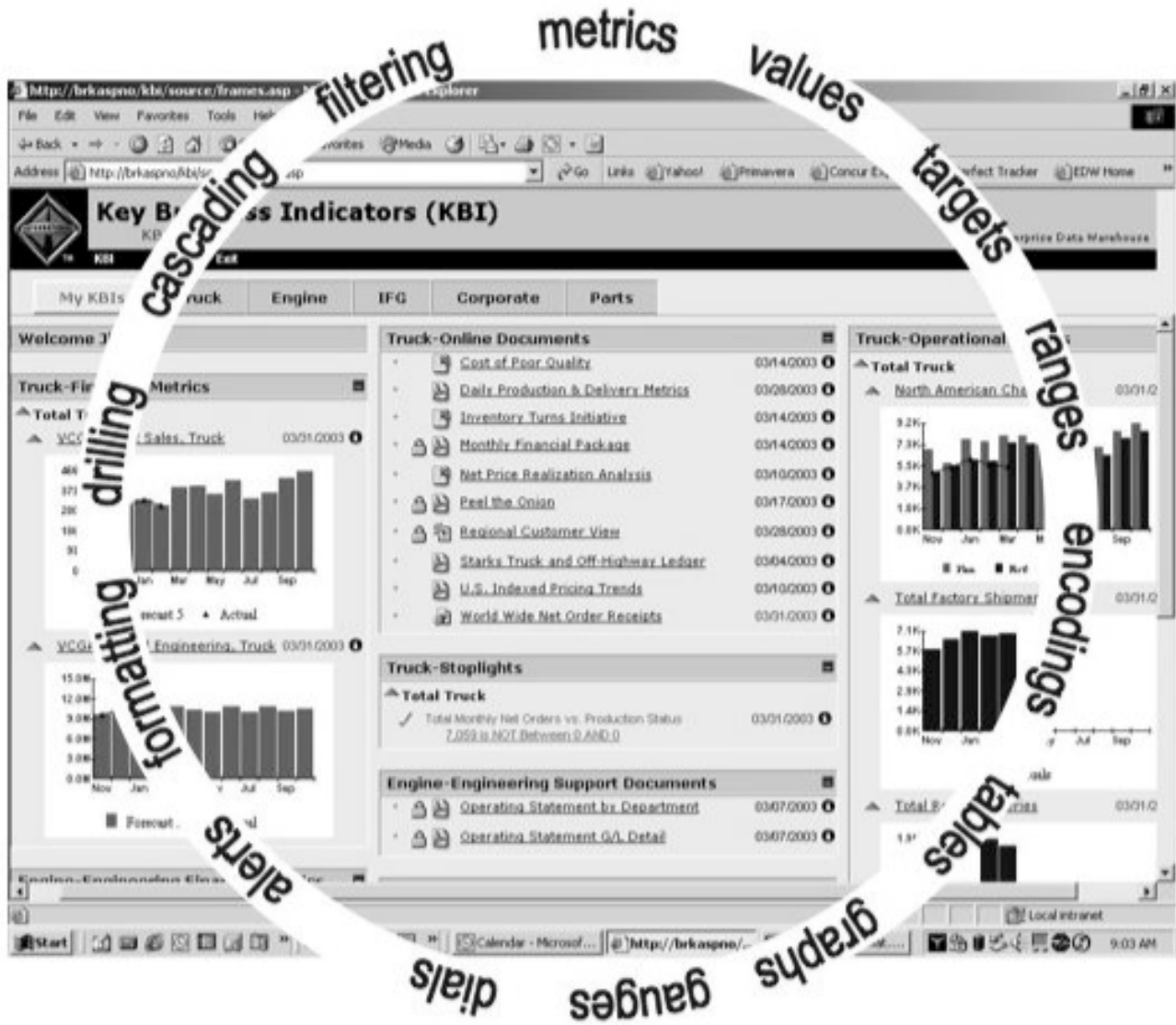
Once performance indicator candidates are identified, you may need to reduce to a smaller list of metrics that are practical to implement and that have the greatest business impact. The facing page illustrates a scoring technique adapted from the work of Karen Degner of BPM Paradigms LLC. Scoring criteria include:

- Link to Strategy
- Ability to Quantify
- Drives Behavior
- Actionable
- Understandable
- Data Availability and Condition
- Common Definition

This is an informative technique, but don't simply implement the top-scoring metrics without considering other factors. In addition to scoring, it is important to achieve a balance of metrics across all scorecard perspectives.

Services Architecture

Dashboard Services



Services Architecture

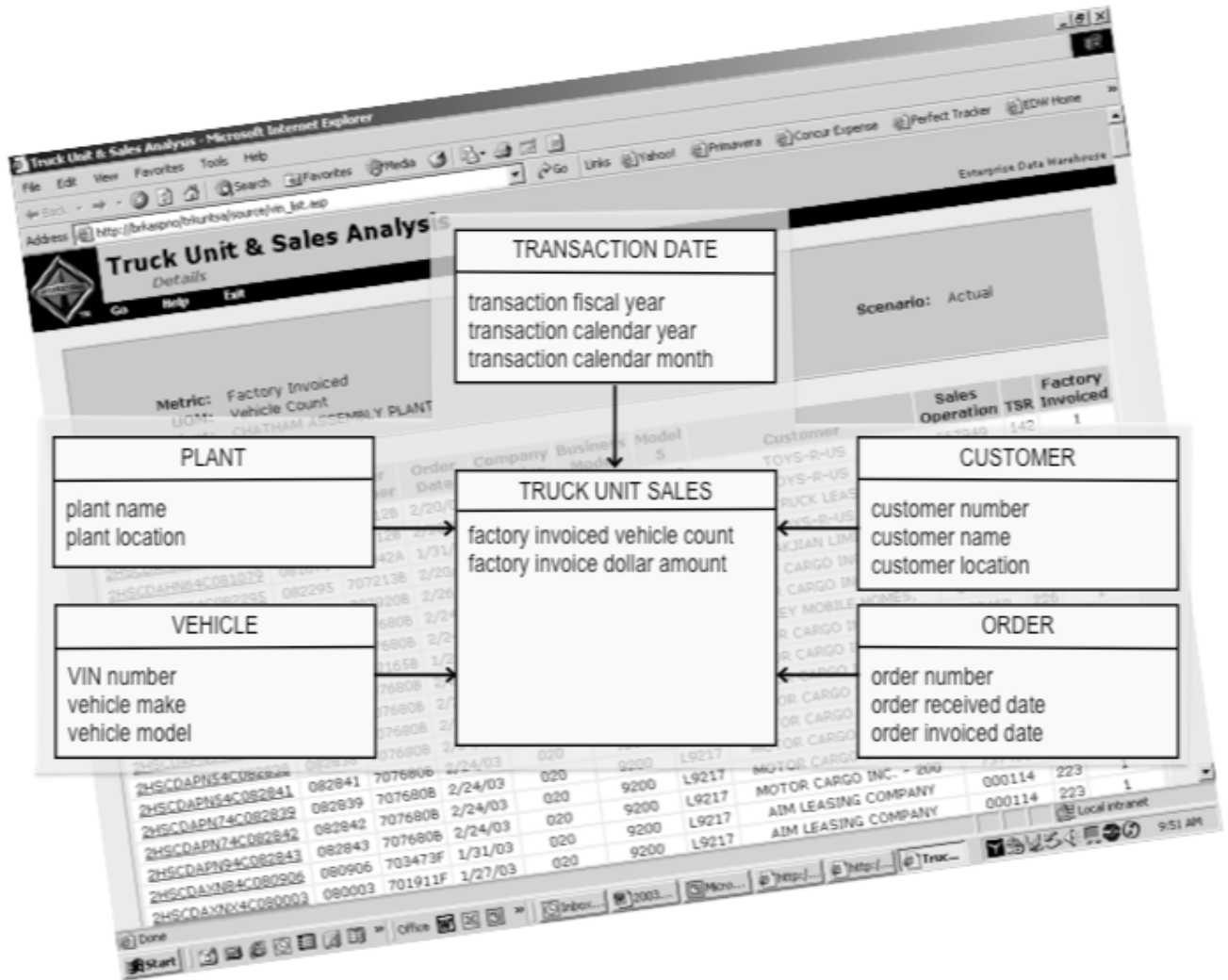
Dashboard Services

QUICK VISUAL LOOK AT KPIS

Dashboard services support the ability to quickly view a small number of KPIs. Dashboards are highly visual presentations of KPIs that integrate a variety of metrics into a graphical display that is designed for high visual impact and rapid absorption. Dashboards combine tables, graphs, gauges, dials, and other encodings for fast and effective communication of business performance information. Dashboard services include the option to drill to scorecards, analysis, and detail data.

Technical Architecture

Data Architecture



Technical Architecture

Data Architecture

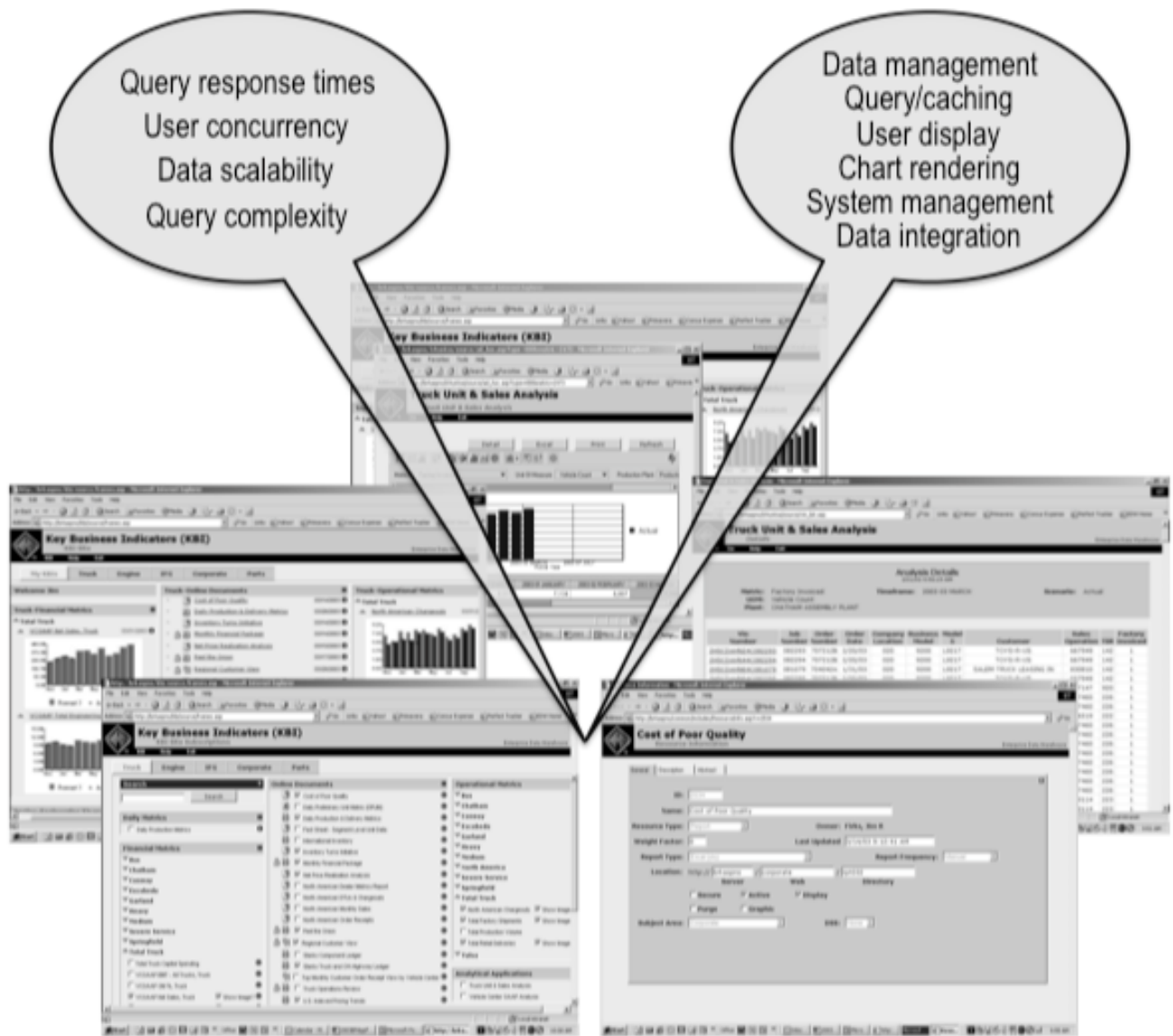
DATA RESOURCE DESIGN AND USE

Data architecture addresses the many complexities of designing, building, and using the data resources to support performance management. Data architecture has many aspects, including but not limited to:

- Sources of performance management data including transaction systems, data warehouses, data marts, etc.
- Data integration both physically and virtually.
- Data structure including key management, dimensionality, and conformity.
- Data freshness that matches the need for low-latency and near-real-time data that is common with dashboards, and that supports the span-of-time and trend data typical for scorecards.
- Query and access including access methods and query performance.

Technical Architecture

Technology Architecture



Technical Architecture

Technology Architecture

PERFORMANCE MANAGEMENT ENABLING TECHNOLOGY

Technology architecture addresses the many complexities of selecting, implementing, and tuning enabling technology for performance management. Technology architecture is concerned with:

- Scalability that is necessary to respond to growth in data volume, number of dashboards, number of scorecards, number of users, etc.
- Performance with special attention to query and access speed that is needed to serve data to highly responsive dashboards and scorecards.
- User concurrency considerations to ensure that individuals do not experience slowdown or gridlock when a large number of people access the same data simultaneously
- User interface conventions to support ease of use, consistent look and feel, navigation and drill-down, etc.
- Chart rendering to quickly and reliably convert tabular data to the high-impact visual presentation that makes effective dashboards.



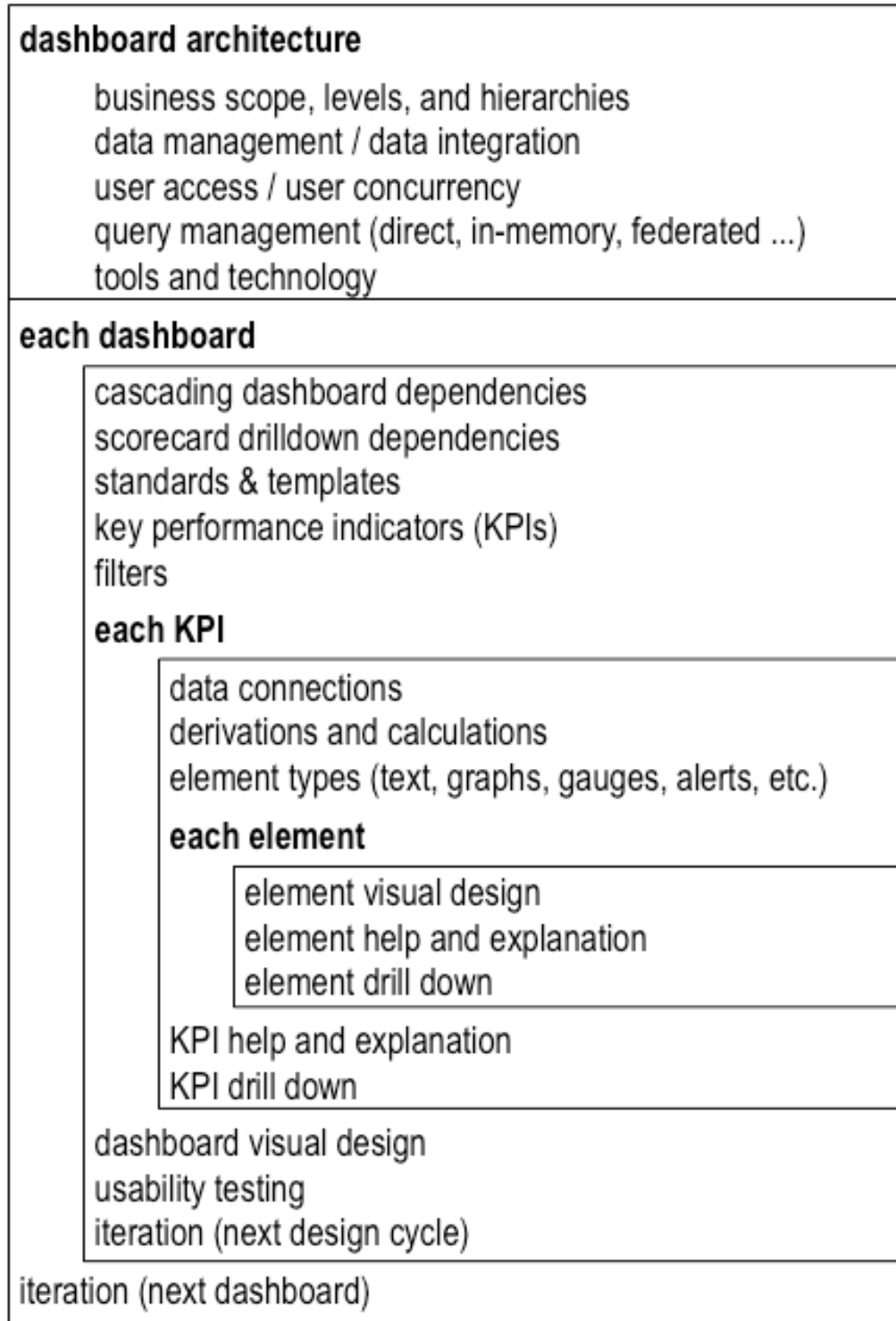
Module 3

Performance Dashboards

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Implementing Dashboards

The Design Phases



Implementing Dashboards

The Design Phases

DASHBOARD ARCHITECTURE

Defining dashboard architecture is a necessary first step before designing dashboards. Architecture establishes the criteria, conventions, and technical infrastructure for dashboard implementation. Architecture considerations include:

- The business scope, levels, and hierarchies of dashboard use
- Data management and data integration needs and conventions
- User access standards and user concurrency requirements
- Query management standards – direct, in-memory, federated, etc.
- The tools and technology for dashboard development and deployment

DASHBOARD DESIGN

Within architectural constraints, each dashboard is designed with attention to:

- Dependencies for cascading dashboards
- Dependencies, relationships, and methods for drill-down from dashboard to scorecards
- Application of standards and templates for accelerated development and consistency of multiple dashboards
- Identification of the key performance indicators (KPIs) included on the dashboard
- Filters for selective viewing of business performance across various business dimensions
- Visual design of the dashboard

Usability testing and iterative design are good practices in dashboard design. Don't assume that you can get it right the first time, or that the users of a dashboard can clearly express their needs without the opportunity to touch and test.

Dashboard Requirements

Business Scope and Stakeholders

	Operational	Tactical	Strategic
Purpose	Control operations	Optimize processes	Manage strategy
Scope	Operational	Departmental	Enterprise
Users	Staff+	Managers+	Executives+
Primary activity	Act	Analyze	Review
Focus	Current	Past	Future
Data Refresh	Intraday/Daily	Daily/Weekly	Monthly/Quarterly
Information	Detailed	Detailed/Summary	Summary
Primary Source	Core systems	Data warehouse	Data mart/Excel
KPIs	Drivers	Outcomes/Drivers	Outcomes
"Looks like a..."	"Dashboard"	"Portal"	"Scorecard"



Dashboard Requirements

Business Scope and Stakeholders

LEVELS OF DASHBOARDS

The first step in gathering dashboard requirements is to determine who the dashboard will serve, and with what capabilities. Eckerson classifies dashboards at three levels: strategic, tactical, and operational.¹

Strategic dashboards typically present KPIs based on some variation of the BSC methodology with extensive drill-down capabilities.

Operational dashboards are similar to automobile dashboards. They provide monitoring and control systems for operational processes, often with limited drill-down features.

Tactical dashboards are most often departmental solutions used to track performance of key processes and activities.

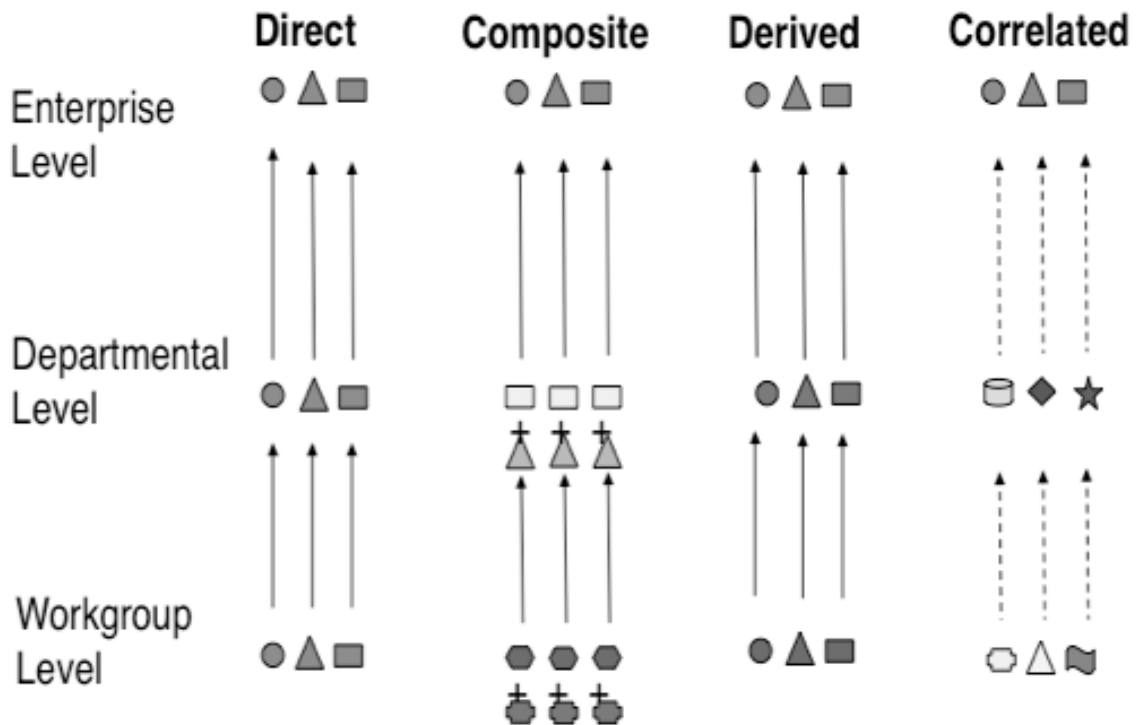
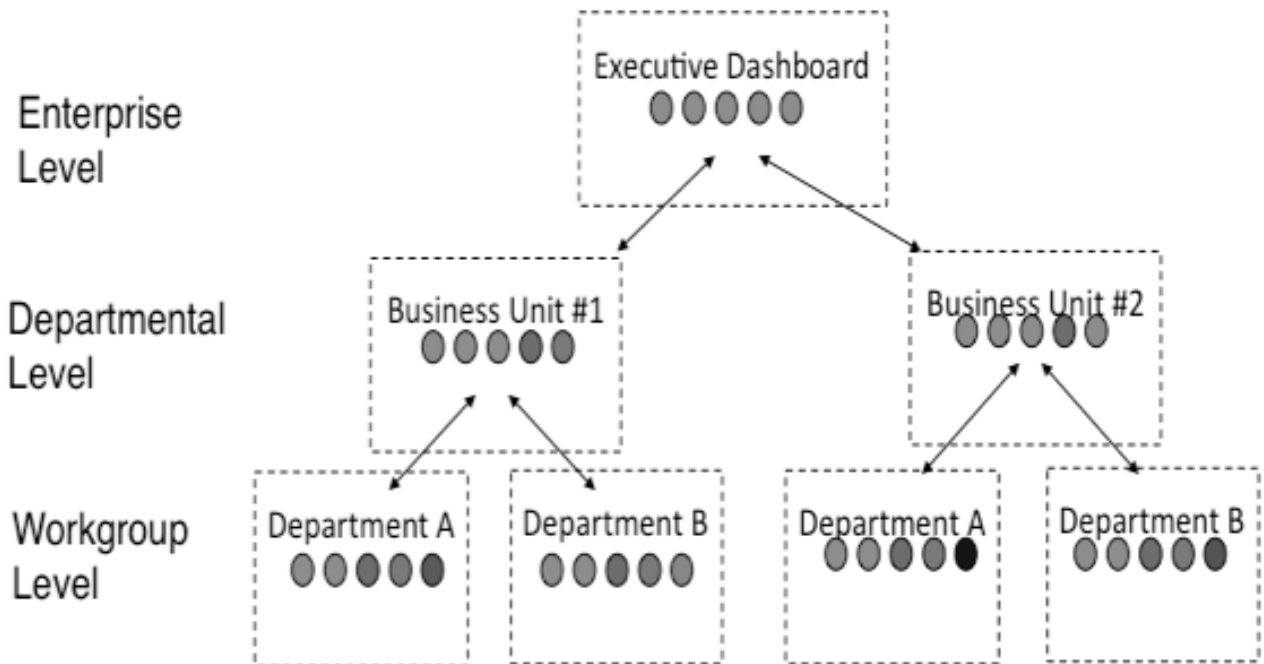
BUSINESS STAKEHOLDERS

Different kinds of business stakeholders map to the level of dashboards that they most commonly use. Most will use multiple dashboards, but each group is associated with a single primary dashboard type.

¹ *Performance Dashboards, Second Edition*, pp. 103-115, Eckerson

Dashboard Requirements

Cascading and Dependency



Dashboard Requirements

Cascading and Dependency

CASCADING DASHBOARDS

Where in a hierarchy of dashboards does your current dashboard effort fit? Do higher-level dashboards exist from which drill-down is possible? Do lower-level dashboards exist (or are they planned) to which drill-down is anticipated? What dependencies exist among multiple dashboards, and how are they represented as requirements?

For dashboards, KPIs roll down while data rolls up. A KPI on the executive dashboard is identical in definition, structure, and calculation to the KPI of the same name that resides on a business unit dashboard. The only real difference is the scope of data used to calculate the metric value.

KPI ROLLUP

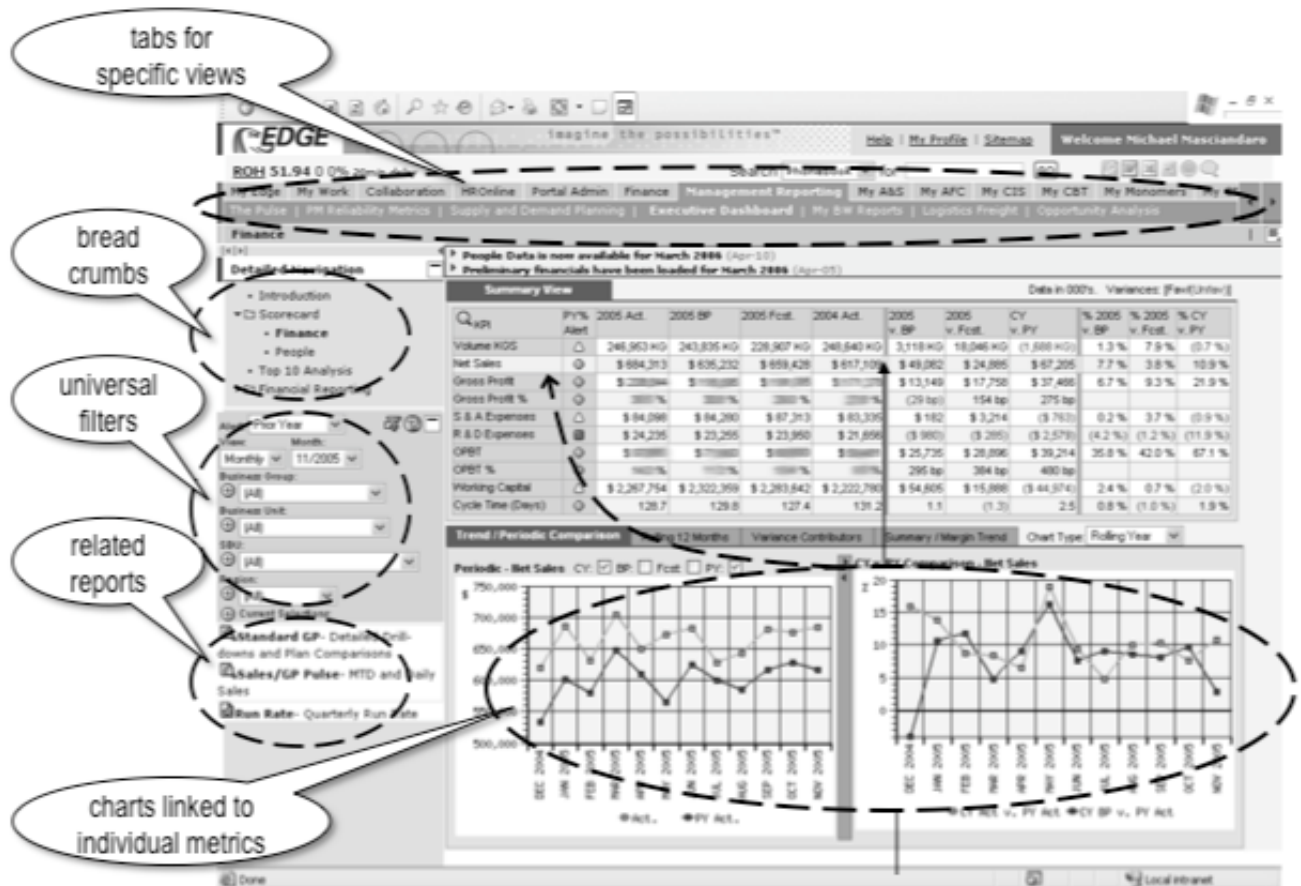
Top-level KPIs are often populated with data from identical KPIs at lower levels. But not all KPIs exist in the same form at all levels. Where differences exist, some work is needed to roll data upward.

There are four ways that data connects through multiple-level KPIs:

- Direct – The same metric exists at all levels. Results are aggregated as data is rolled up. (This is the most common KPI rollup.)
- Composite – A higher-level metric is calculated from two or more lower-level metrics. For example, a *sales and administration expense* metric is derived as the sum of *sales expenses* and *administration expenses*.
- Derived – The same metric is used at different levels, but the definition varies between levels or across business units. Results need to be homogenized and standardized before roll up. Derivation is a symptomatic fix. Data governance and standard definition are the root cause corrections.
- Correlated – This occurs when a lower level metric influences a higher level indicator. For example, a company's analysis shows that a 5 percent increase in customer satisfaction generates a 10 percent increase in revenue. Correlation exists but the objectives and the metrics are different at each level. Roll up of data is not possible.

Dashboard Design

Element Layout



Dashboard Design

Element Layout

BEYOND ITEM PLACEMENT

Item placement is only the beginning of visual design. Next you need to design the entire layout of dashboard elements. How do they fit together on a single screen? How do they support ease of navigation? How do they support rapid absorption?

The example on the facing page illustrates some common layout techniques:

- **Tabbed Interface** – Using tabs across the top of the page to show specific views (departmental views, for example) that are available and to provide fast navigation among those views.
- **Bread Crumbs** – Highlighting active filters to trace the path of navigation and avoid confusion about the data being viewed.
- **Universal Filters** – Consistent placement and layout of frequently used filters such as dates, organizational units, and other conformed dimensions throughout all dashboards.
- **Related Reports** – Quick links for navigation to reports that provide drill-down and detail of the KPIs that are displayed.
- **Linked Charts** – Dynamically changing graphs that are synchronized with selection of a specific KPI.



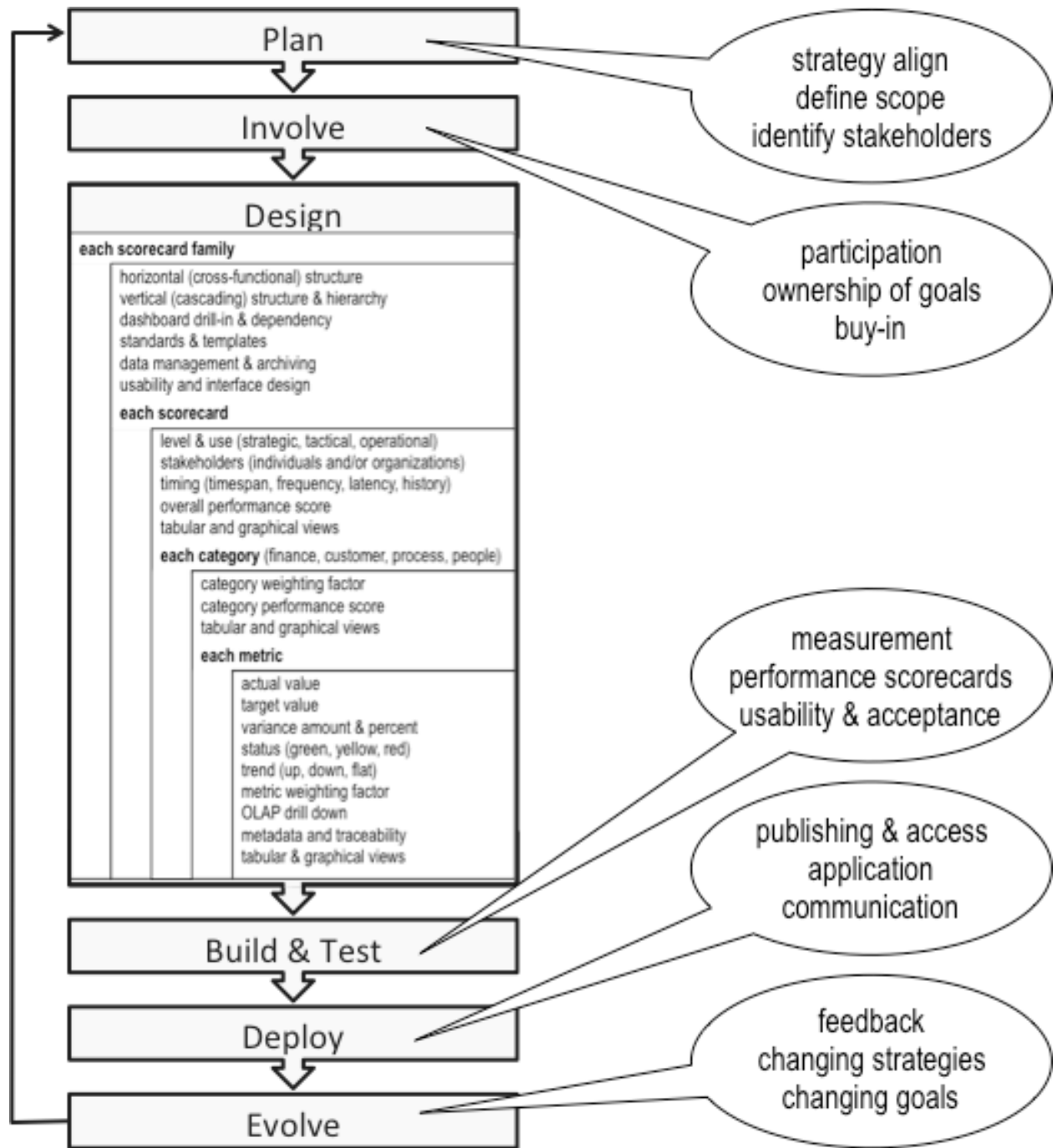
Module 4

Performance Scorecards

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Implementing Scorecards

From Planning to Production



Implementing Scorecards

From Planning to Production

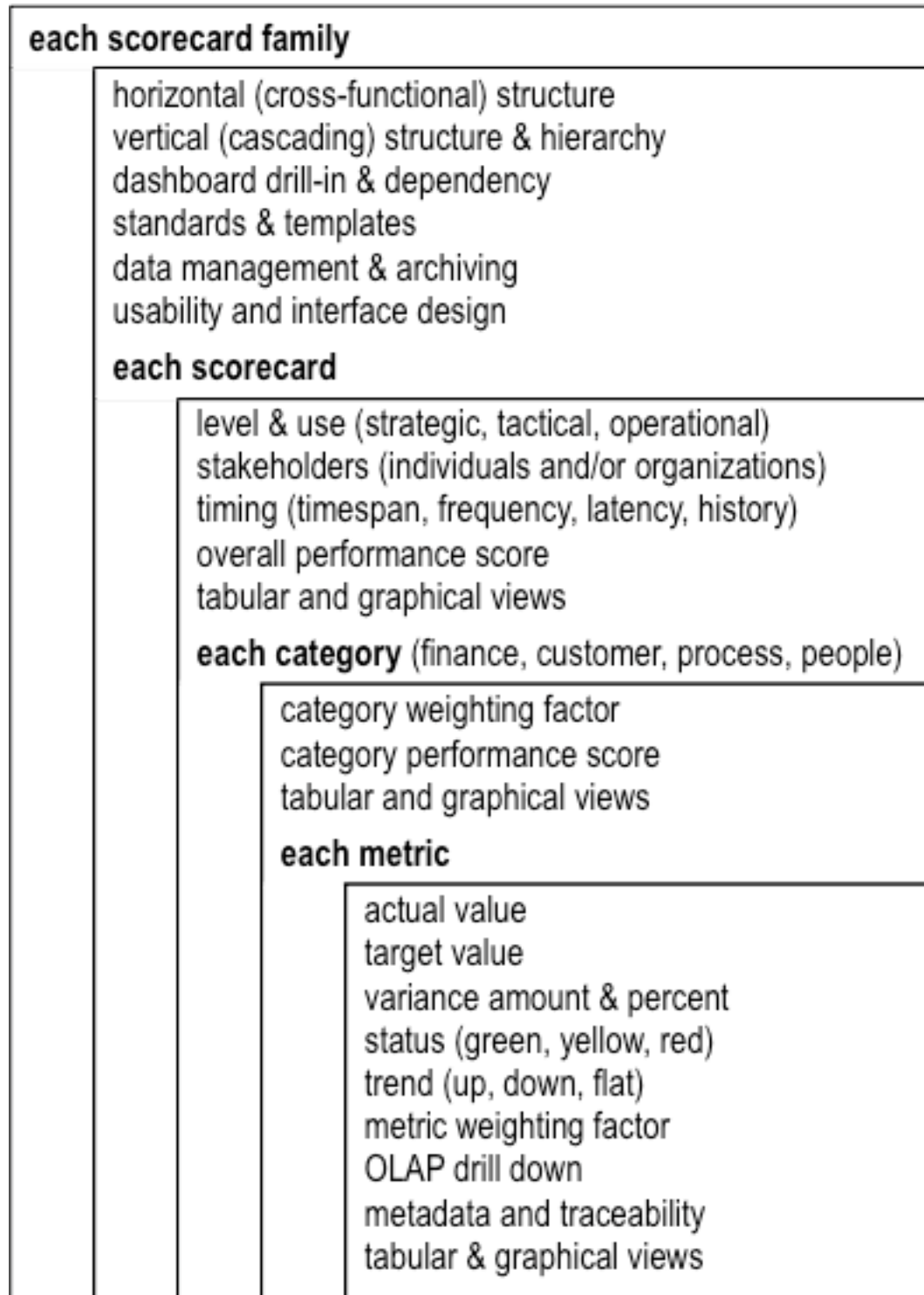
MORE THAN DESIGN

Design is important but is still only one part of scorecard implementation. The entire implementation process encompasses:

- Planning to align scorecards with business strategy, set the scope, and identify the business stakeholders.
- Involvement to engage the participation of stakeholders, and to ensure that the stakeholders buy into performance management processes and take ownership of their performance goals.
- Design, as previously discussed, through the levels of scorecard families, scorecards, performance categories, and individual metrics as performance indicators.
- Development and testing of measurement processes, scorecard production processes, and scorecard usability and acceptance.
- Deployment of scorecards, which goes beyond publishing to include application as the human activities of analysis and communication.
- Evolution of performance management with feedback, recognition and responsiveness to change, and iteration.

Implementing Scorecards

The Design Phases



Implementing Scorecards

The Design Phases

SCORCARD FAMILIES

Designing scorecards is a layered process that begins by recognizing that a scorecard is not a stand-alone entity. Scorecards are related to other scorecards both horizontally and vertically. A scorecard “family” is a collection of related scorecards – all sales performance scorecards, for example, may include a cascading structure of sales executive, sales manager, and salesperson scorecards. Scorecard family design defines the structure and standards for all scorecards in the group:

- Horizontal or cross-functional relationships
- Vertical and hierarchical structures of cascading scorecards
- Connection with and drill-in dependencies from dashboards
- Standards and templates for scorecard design
- Data management and archiving conventions for the family
- Usability and user interface design for the family
- The specific set of scorecards included in the family

SCORECARDS

Within the standards and constraints of scorecard family design, the content and presentation of each scorecard is designed including:

- Consideration of the level and use of the scorecard, and of the individuals and organizations who will use it
- Timing considerations including timespan and intervals represented, frequency of measures, latency of measures, and historical retention
- Calculation and presentation of an overall performance score
- Scorecard-global conventions for tabular and graphical views of performance indicators
- The categories of performance indicators contained in the scorecard

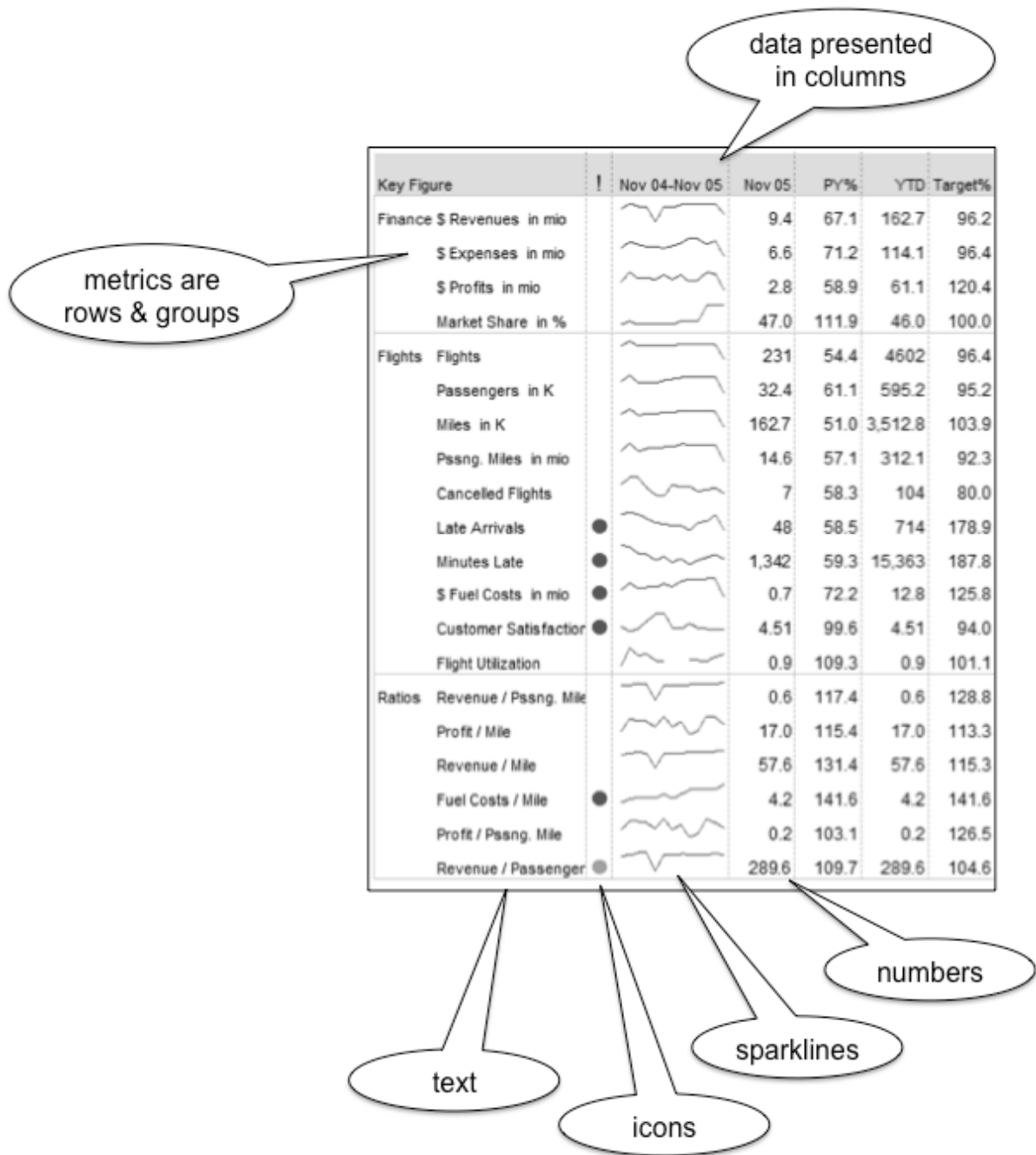
PERFORMANCE INDICATOR CATEGORIES

The metrics in a scorecard are ideally organized by category, often the BSC classifications. Each category may need:

- A category weighting factor that determines its contribution to the overall performance score
- Calculation and presentation of a category performance score
- Category-specific conventions for tabular and graphical views of performance indicators
- The set of metrics that are performance indicators for the category

Scorecard Design

Tabular Views



Scorecard Design

Tabular Views

INDICATORS IN TABLES

Tabular views present performance indicators in tables – as a collection of rows and columns. Each row presents one metric or a group of related metrics. Grouping forms a metric hierarchy that is commonly indicators grouped within scorecard perspectives. Each column presents an attribute of a metric or group – name, status, trend, actual value, target value, variance, etc. Columns may contain text, numbers, icons (encodings), or sparklines.

Performance Indicators

Displays and Encodings

Name	Trend	Status	Target	Actual	Variance%
Finance					
● Decrease European Discounts	+	✓	16.00 %	15.53 %	-3%
● Keep APAC discounts < 17%	-	✗	17.00 %	24.77 %	31%
● Keep N.A. discounts < 17%	-	✓	17.00 %	15.66 %	-9%



Performance Indicators

Displays and Encodings

A TALE OF TWO SCORECARDS

Examine the scorecard examples on the facing page, and note the differences between the two styles of presentation. The scorecard at the bottom of the page (created by Stephen Few) uses different visualization techniques to display KPI attributes.

- The top example uses plus and minus signs to show trends. The bottom scorecard uses a sparklines, which offer a more robust view of trends while still fitting into condensed space.
- Both examples use stoplights to show status, but there are still significant differences. The stoplights at the top accommodate colorblindness with differentiating symbols. The example at the bottom shows stoplights only if red or yellow. Removing the green lights makes the red and yellow lights more prominent in the display.
- The upper example shows target value, actual value, and variance percent as numerical text. The lower example shows only actual value numerically. But it shows target values, actual values, and ranges as bullet graphs.

What's not shown here? Why? (Targets, variance, variance percent, green stoplights) Is that valid? My boss probably wants to know exactly what the monetary gap is that he has to close this quarter.



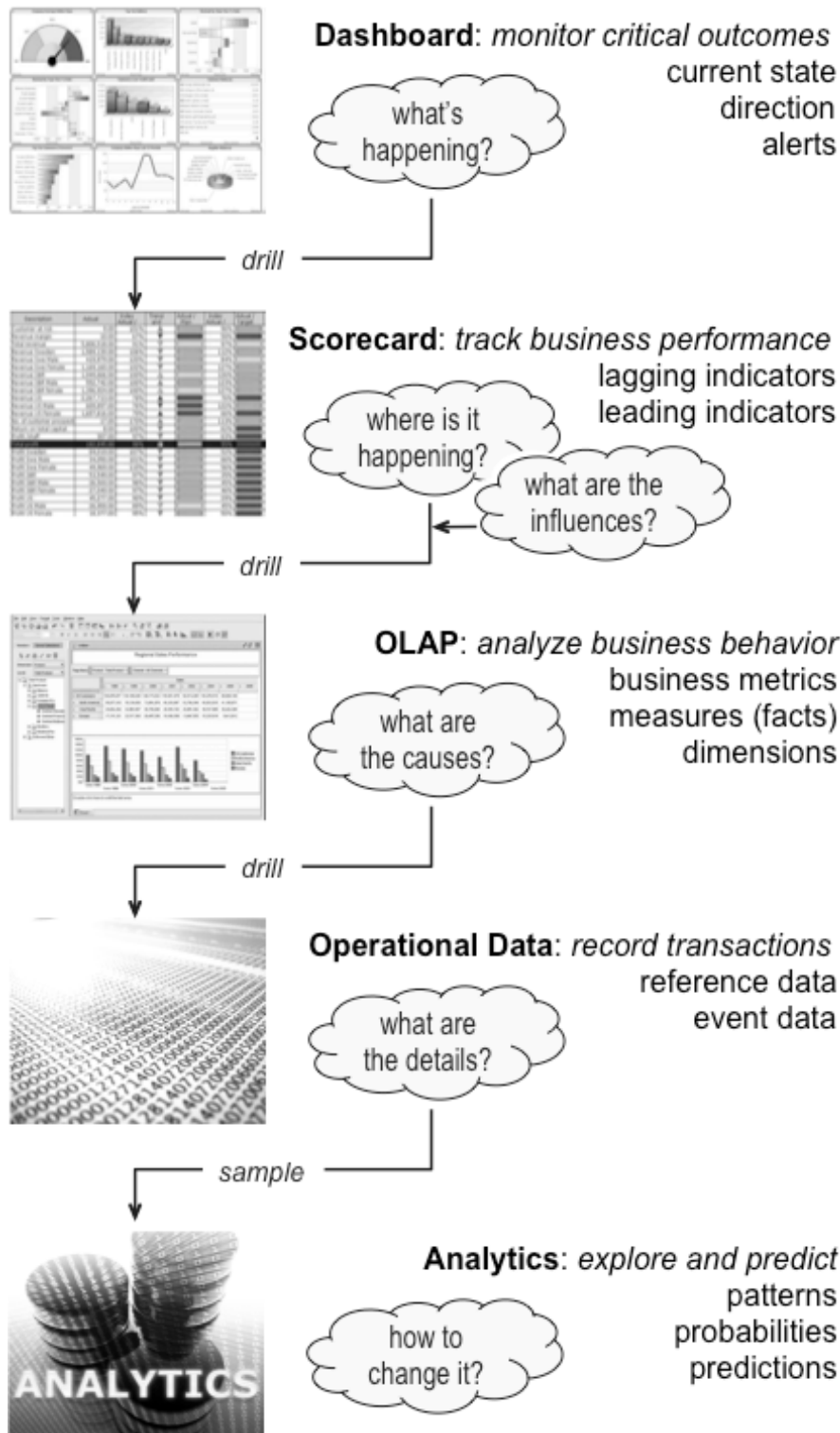
Module 5

Summary and Conclusion

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Integrated Performance Management

From Dashboards to Transaction Data



Integrated Performance Management

From Dashboards to Transaction Data

END-TO-END AND FULL-CIRCLE PERFORMANCE MANAGEMENT

The full scope of performance management involves analysis, knowledge, decision, action, and the tools to support these activities. Those tools, of course, include measurement and data at several levels:

- Dashboards to know the current state of business performance, see directions and trends, and receive alerts about important behaviors or conditions.
- Scorecards to track and analyze business performance with lagging indicators for retrospective views and leading indicators for prediction.
- OLAP for drill-down analysis of business behavior with dimensional views of business metrics and measures.
- Operational data that records business transactions and events, supports drill to atomic-level detail, and supplies much of the source data for business measurement.
- Business analytics that samples operational data for mining and statistical analysis. Analytics discover patterns and probabilities to make predictions, and often bring to the surface new performance indicators for use in scorecards and dashboards.

