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]

TDWI Enterprise Metrics

Designing Integrated Business Metrics

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Module 1

Concepts and Definitions

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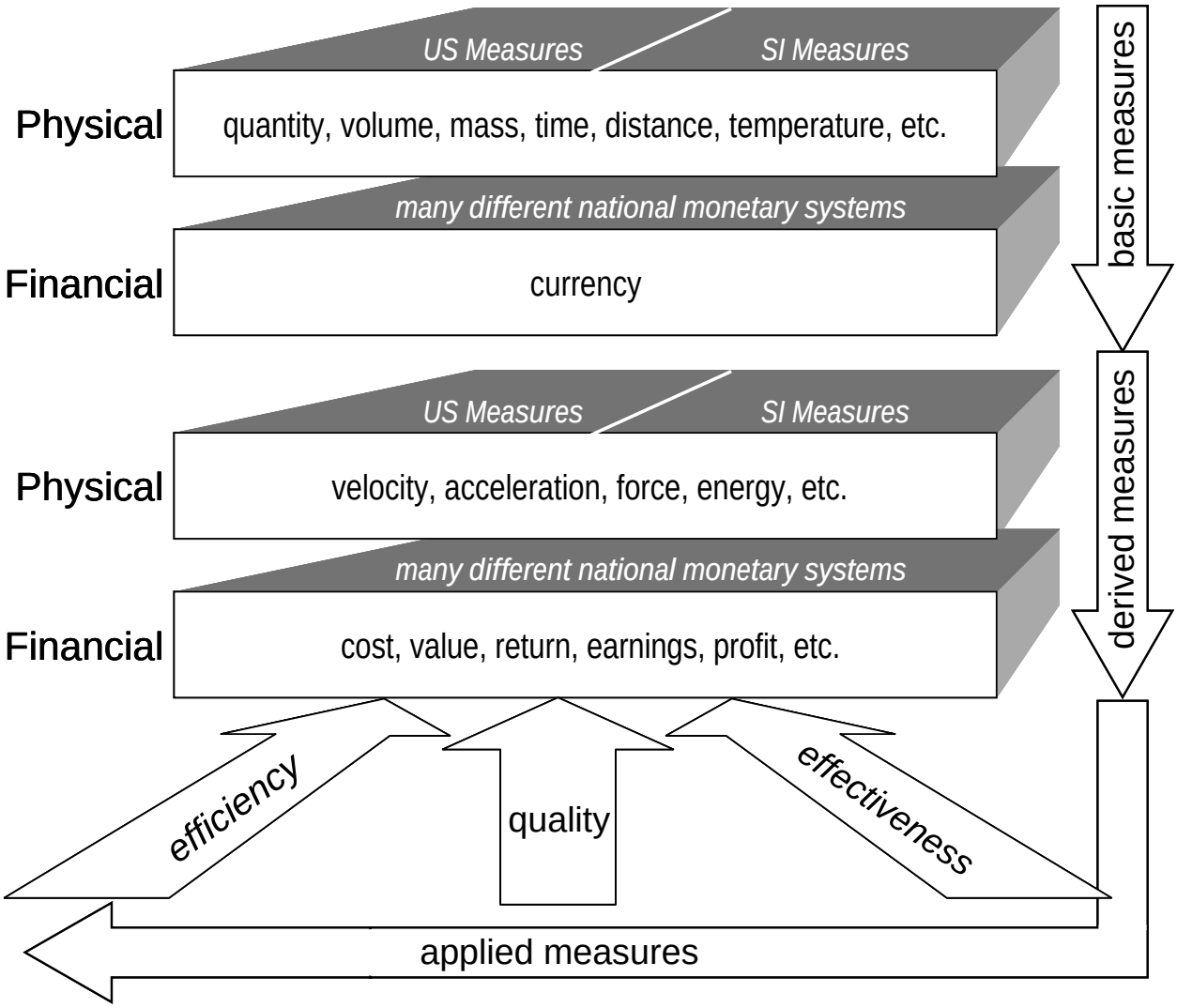
Business Measurement Systems

Units of Measure



Business Measurement Systems

Units of Measure

OVERVIEW

Measurement is a process that compares the magnitude of some variable we are interested in against a standard reference unit.

SYSTEMS OF MEASUREMENT UNITS

Systems of Measurement define the standard references that will be used for all measurement categories supported by the system. Historically they have been based on local and country specific units of measure. The trend toward global markets is driving countries to evolve their standard systems of measurement to the System de International (SI) which is commonly called the metric system. Historically, countries that had colonial ties to Britain used the Imperial Units as their system of measurement. Countries such as the UK and Canada have made significant progress towards moving to the SI system. The US is moving to the SI system at a slower pace. In the US, the Imperial System has been modified and adapted to become what is known as the US Customary Units system of measurement, also known as the English Units system.

MEASUREMENT CATEGORIES

The SI and US systems of measurement only apply to measuring physical characteristics. Businesses also measure things in other categories than just physical measurements. The following categories show a comprehensive set of measurement categories used by businesses.

- Physical – based on either the SI or US systems of measure
- Financial – based on currency and financial systems
- Intangible – based primarily on opinions, surveys and evaluations
- Process – based on time durations, activity levels and counts

BASE MEASURES

In the SI metric system, the base units of measure exist for mass, time, length, electric current, temperature, quantity of matter and luminous intensity. In the US Customary system, base units exist for length, area, wet volume, dry volume, mass and weight (three types), cooking measures, grain measures and temperature.

DERIVED MEASURES

In the SI metric system, some common derived physical units include velocity, acceleration, power, energy, frequency, weight and pressure. In the US Customary system, some common derived physical units include horsepower, velocity, acceleration, energy, power and pressure.

APPLIED MEASURES

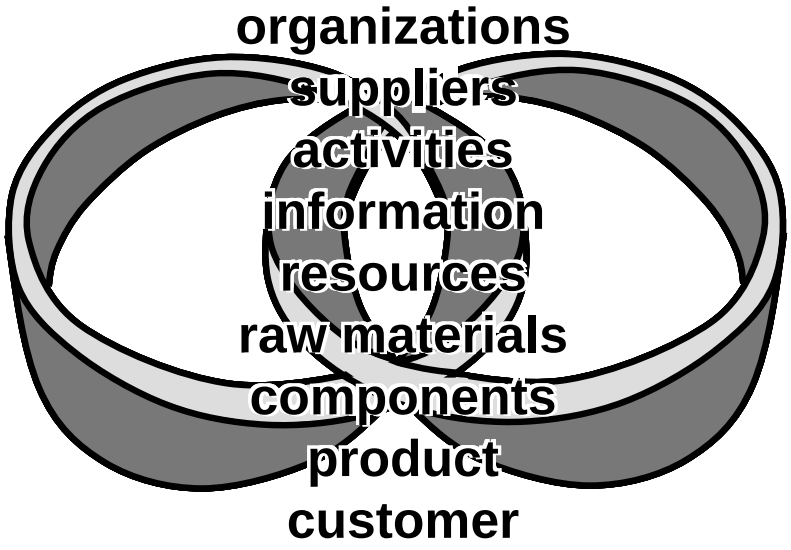
Applied measures define how the business will use the underlying measured values in a context specific case. Common applied areas in business include measures of effectiveness, efficiency and quality.

The Metrics Supply Chain

Overview and Definitions

A supply chain … is a coordinated system of organizations, people, activities, information and resources involved in moving a product … from supplier to customer. Supply chain activities … transform raw materials and components into a finished product that is delivered to the end customer.

www.wikipedia.org



Although not included in the wikipedia definition, a supply chain also implies a delivery system and some applications or usage through which the customer derives value.

Dave Wells, TDWI

The Metrics Supply Chain

Overview and Definitions

OVERVIEW

A common definition of a supply chain describes it as a coordinated system of organizations, people, activities, information and resources involved in moving a product from primary suppliers to the ultimate customer. Supply chain processes and activities transform raw materials and components into a finished product that is delivered to the customer. An alternative to this definition implies that a supply chain can also be viewed as a delivery system that provides some application or usage through which customers derive value.

DEFINITIONS

A supply chain is made up the following building blocks.

Stages
A supply chain stage is the same concept as major activity group or high level phase in the chain from supply to customer. Examples of a supply chain stage are Raw Material Extraction, Manufacturing, Assembly, Warehousing, Distribution Center, Retail Outlet, Customer. Stages are predefined high level phases of the overall supply chain.

Links
A link in a supply chain represents the path between any two stages. Links are usually transportation oriented for moving products and materials, but they can also be more generic depending on the type of flow that is managed.

Flows
A supply chain flow describes what is moving through the chain and how it must be managed. Supply chain flows include orders, products, information and funds. Each type of flow requires unique processes and management attention.

Processes
Supply chain processes are business processes executed by the assigned party within the chain. Processes include mining, transportation, manufacturing, storage, retail, distribution, procurement, marketing, customer service and financial accounting.

Governance
Supply chains are made up of several organizations that need to work together in an efficient manner. Governance models are essential to make supply chains operate in a profitable manner.

Module 2

The Challenges of Metrics

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Defining the Right Metrics

Distinguishing Metrics from Measures

Measure: A single, quantifying data value in context of the thing that it quantifies.

Metric: A system of measures based upon standard units.

Business Metric: A metric with the context of business goals.

MEASURE	METRIC
data	information
fine-grained	aggregated
point-in-time	span of time
discrete	comparative
system/process context	business context
quantify	inform and act

Defining the Right Metrics

Distinguishing Metrics from Measures

BACKGROUND

When a measurement program is in its definition phase, analysts must identify the information requirements to be delivered by the new measurement system. Metrics and measures are related items both rooted in the measurement process. However, they have different characteristics and play different roles within a measurement system. It is important to distinguish these two items and apply them in the proper context when identifying the measurement system requirements.

DEFINITIONS

A measure is defined to be a single, quantifying data value within the context of the thing that it quantifies.

A metric is defined as a system of measures that is based on a standard set of units.

To extend this definition further, a business metric is a metric within the context of business goals.

COMPARING MEASURES TO METRICS

The following properties of measures and metrics provide further insight into how these items can be distinguished.

Properties of a Measure

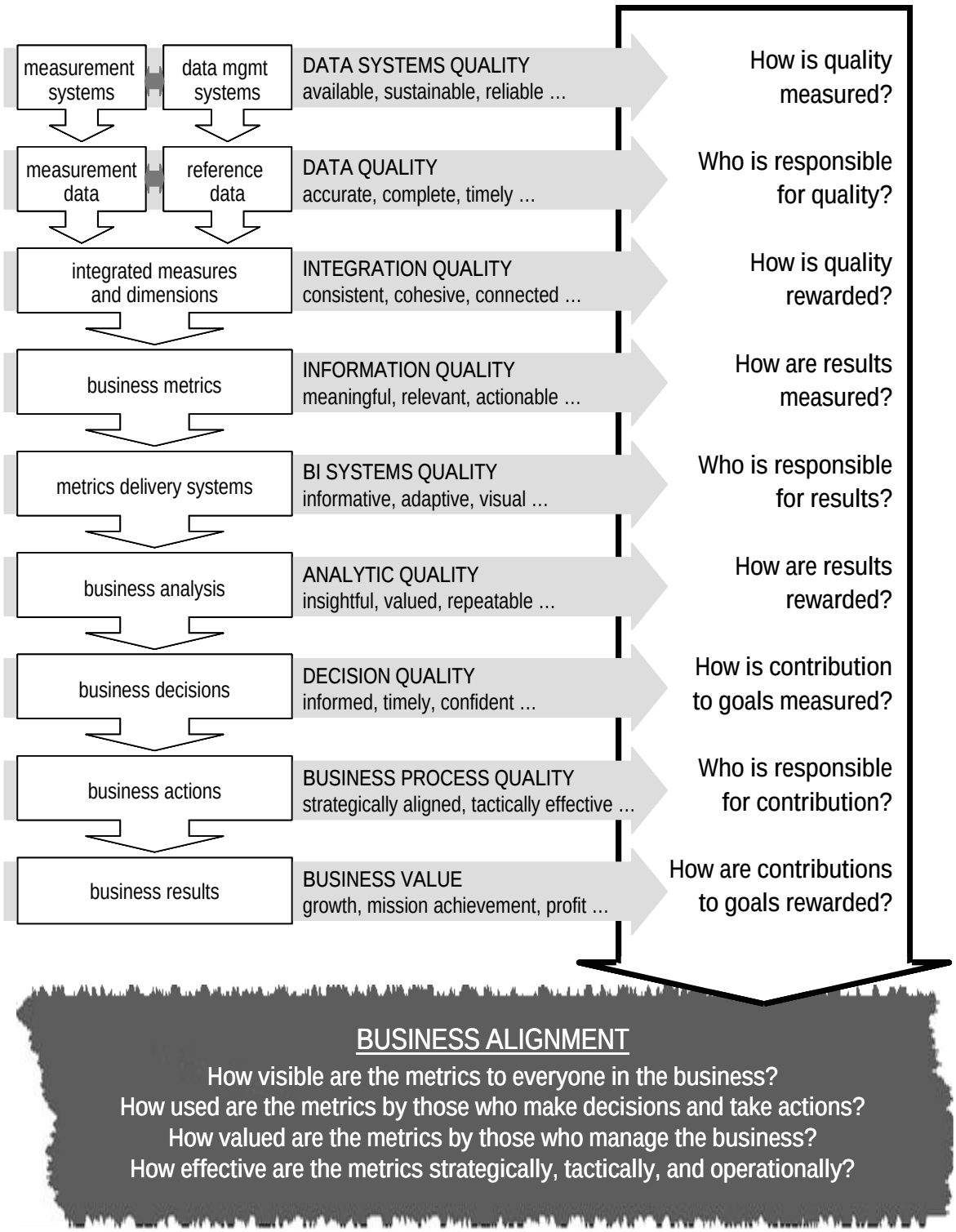
- Exists as Data
- Fine-grained and Detailed
- Valid at a Point in Time
- Discrete Value
- Based on a System or Process Context
- Purpose is to quantify

Properties of a Metric

- Exists as Information
- Aggregated
- Tracked across a Span of Time
- Comparative Value
- Based on a Business Context
- Purpose is to Inform and Enable Action

Maintaining Business Alignment

Accountability and Incentives



Maintaining Business Alignment

Accountability and Incentives

INTRODUCTION

Integrated, high quality and relevant metrics help managers maintain alignment throughout their organizations over time. However, the metrics supply chain that managers depend on for the delivery of these high quality metrics also has its own issues and challenges related to alignment. Like all supply chains, the metrics supply chain is designed, managed, maintained and used by several different teams and groups throughout the organization. This multi-stakeholder, cross functional team situation is common to supply chains, but it must be well managed and controlled over time to ensure that the metrics delivery process is sustainable.

EVALUATING THE METRICS

The metrics delivered by the supply chain must be routinely reviewed and evaluated to ensure that they are helping to maintain the necessary organizational alignment. The following questions should be answered on a regular basis as part of the metrics evaluation and review process.

- How visible are the metrics to everyone in the business?
- How used are the metrics by those who make decisions and take actions?
- How valued are the metrics by those who manage the business?
- How effective are the metrics strategically, tactically and operationally?

ACCOUNTABILITY AND INCENTIVES

Each stage of the metrics supply has its own issues and challenges to maintain sufficient levels of quality.

Based on the various categories of quality across the supply chain discussed earlier, the following questions should be answered to ensure that sufficient accountabilities and incentives have been assigned.

- How is data quality measured?
- Who is responsible for quality?
- How is quality rewarded?
- How are quality results measured?
- Who is responsible for the results?
- How are results rewarded?
- How is contribution to goals measured?
- Who is responsible for the contribution?
- How are contributions to goals rewarded?

Module 3

Extending Data Modeling for Metrics

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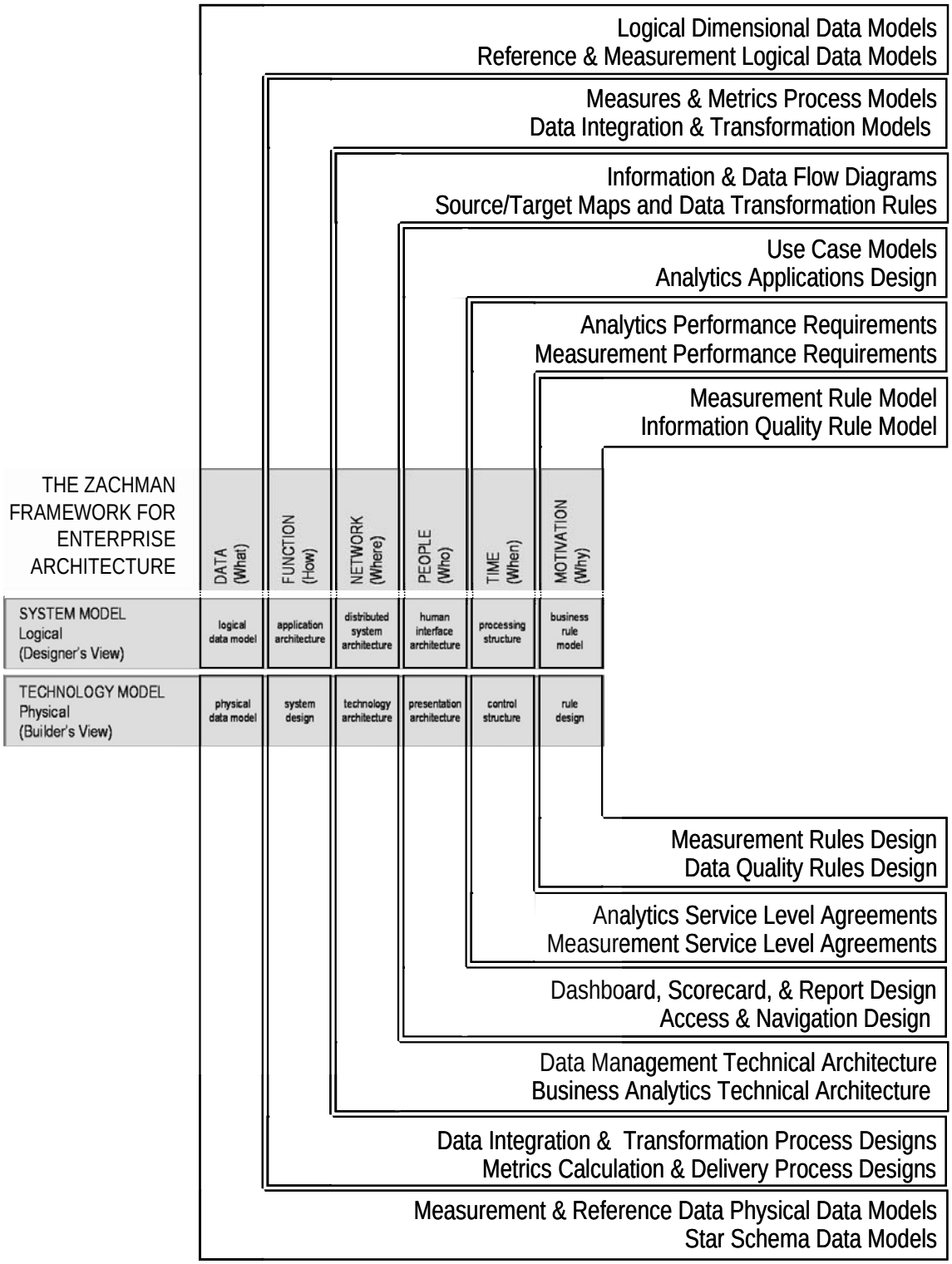
Metrics Modeling vs. Data Modeling

Logical Modeling and Physical Design



Metrics Modeling vs. Data Modeling

Logical Modeling and Physical Design

LOGICAL MODELING

Logical modeling occurs at the third level of Zachman to create the first iteration of design. The framework defines this to be the System Model. The following types of models are created.

What
- Logical Dimensional Data Models
- Reference and Measurement Logical Data Models

How
- Measures and Metrics Process Models
- Data Integration and Transformation Models

Where
- Information and Data Flow Diagrams
- Source to Target Maps and Data Transformation Rules

Who
- Use Case Models
- Analytics Applications Design

When
- Analytics Latency Performance Requirements
- Measurement Latency Performance Requirements

Why
- Measurement Rule and Information Quality Rule Models

PHYSICAL DESIGN

The Physical Design produces a Technology view of the measurement system. The following types of models are produced.

What
- Measurement & Reference Data Physical Data Models
- Star Schema Data Models

How
- Data Integration & Transformation Process Designs
- Metrics Calculation & Delivery Process Designs

Where
- Data Management Technical Architecture
- Business Analytics Technical Architecture

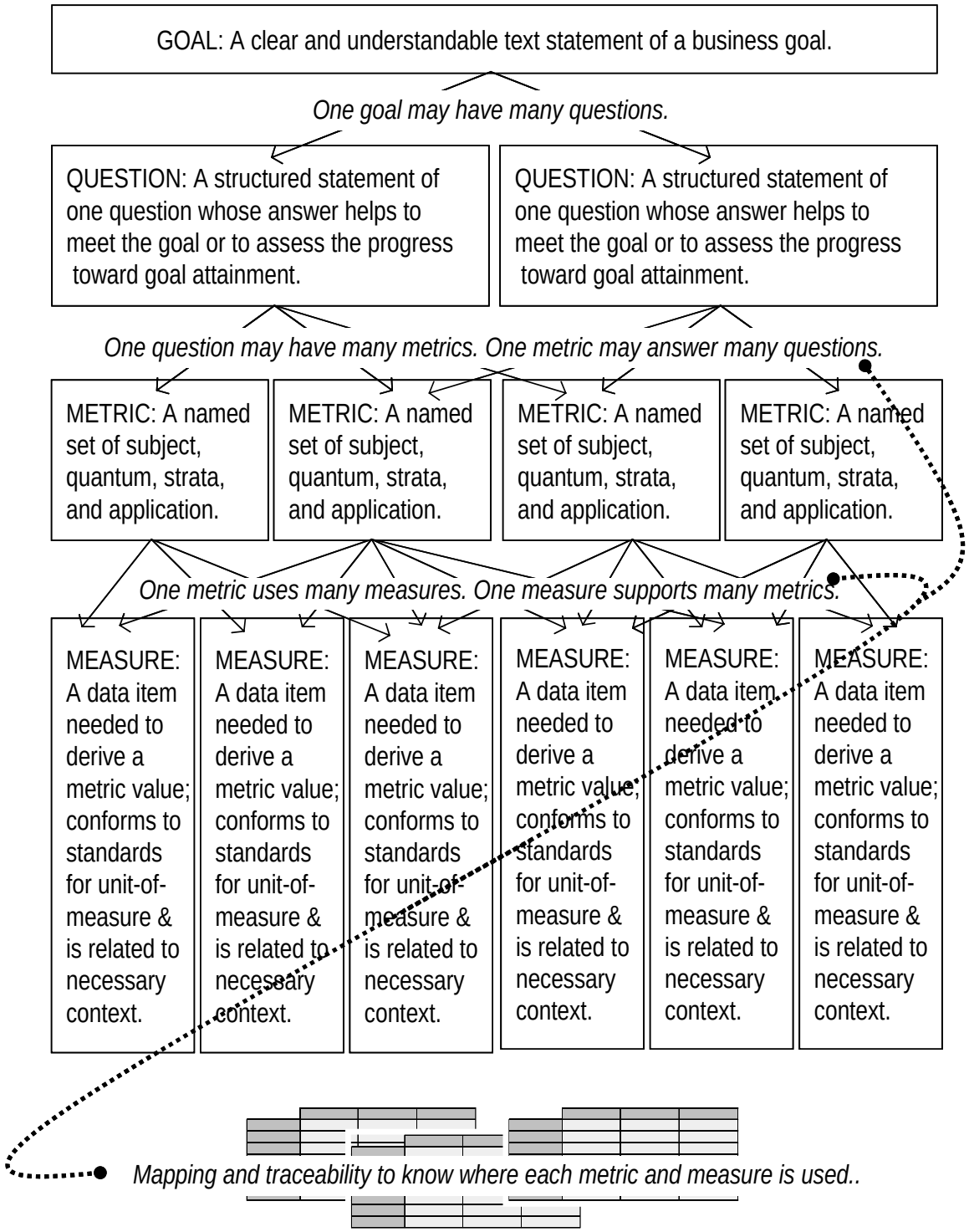
Who
- Dashboard, Scorecard and Report Design
- Access and Navigation Design

When
- Analytics and Measurement Service Level Agreements

Why
- Measurement and Data Quality Rules Design

GQMM Models

Approach and Deliverables



GQMM Models

Approach and Deliverables

APPROACH

The following rules should be followed to navigate between the steps of the GQMM process.

1. Clearly define a set of business goals that are aligned to strategy and objectives of the organization. The goals should have the characteristics of being measurable and achievable.

2. For each goal, apply the GQMM process to identify the related metrics and measures. Each goal may have many questions associated with it.

3. Each question may have many metrics associated with it and each metric may assist in answering many questions.

4. Each metric may require the usage of many measures and each measure may support the implementation of multiple metrics.

5. Each metric and measure should be mapped to understand and document their usage and application.

DELIVERABLES

The following deliverables are created by the GQMM process.

Goals
Goals are clear and understandable text statements of what the business wants to accomplish.

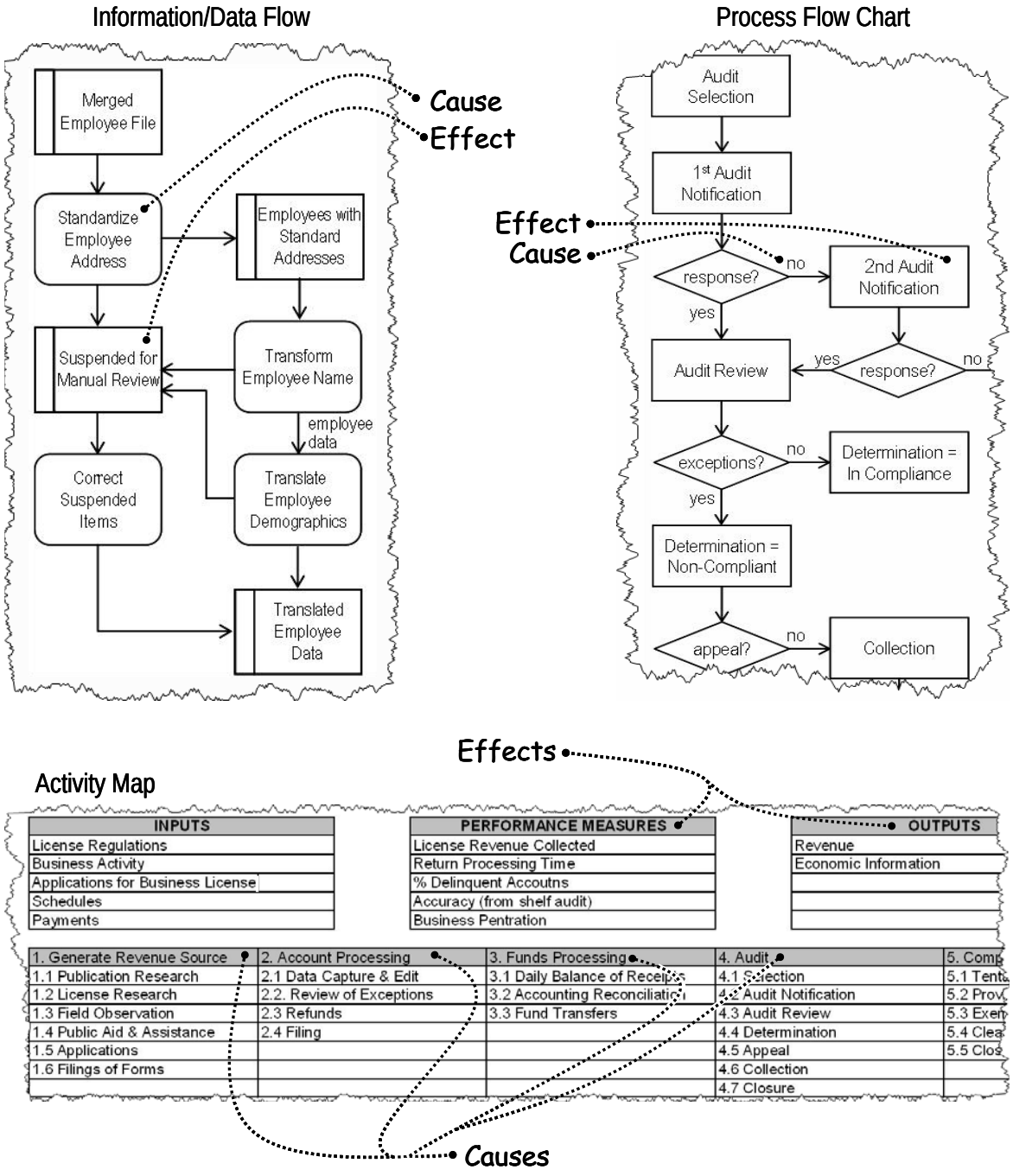
Questions
Questions are structured statements of individual questions whose answer helps to meet a particular goal or to assess the progress made toward goal attainment.

Metrics
Metrics are named sets of a specific subject, quantum, strata and application.

Measures
Measures are data items needed to drive a metric value. They must conform to standards for units of measure and any related and essential business context.

Causal Models

Process Models



Fit the process modeling technique to your needs and purpose.
Different kinds of models examine causal relationships at varying levels of detail.

Causal Models

Process Models

DESCRIPTION

Process models describe the sequence of activities, dependencies, decisions, input conditions and output conditions in different types of processes. Process models display connectivity between functional blocks. The connectivity can be used describe capacity constraints, information flow, control actions, dependencies and logic paths.

It is recommended that the process modeling technique is selected based on the problem being analyzed. There are many techniques that examine causal relationships, but they tend to operate at different levels of detail.

EXAMPLES

The diagram on the facing page illustrates three different types of process models and an example of an embedded cause and effect relationship.

Information or Data Flow Model
This type of model shows how data flows through a series or functional process blocks. An example of a cause is shown as "Standardize Employee Address" and the effect is shown as "Suspended for Manual Review"

Process Flow Chart
This type of model shows the logic paths and sequencing between activities or functions. An example of a cause is shown as a "No" decision from the Response decision block with a resulting effect of sending out a "2nd Audit Notification"

Activity Map
This form of model relates functions performed in a work flow and the results or effects that are produced. An example shown describes several causes based on employee actions that link to performance measures and business outputs such as revenue.

Module 4

Goal-Question-Metric-Measure Case Study

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GQMM Technique	4-10
Logical Data Modeling	4-24
Model Validation	4-28

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Case Study Background

Industry Perspective

- Rapid population growth
- Stage regulated
- Asset intensive
- Capital planning and control
- Changing Regulations

  from cost-based to performance-based
  without guaranteed ROI for capital projects
  higher risk potential, higher reward opportunity
  demands efficient capital management

Case Study Background

Industry Perspective

INTRODUCTION

The case study presented in this module describes some of the challenges and opportunities facing the executive team at a regional utility company. The company provides gas and electric services to customers in a medium sized city and its surrounding suburbs in an area that is experiencing rapid population growth. The company is called Prime Utility and its operations are regulated by an agency at the state level.

Utility companies are asset intensive. They require large investments of capital to build the generation, transmission, and distribution facilities needed to provide safe and reliable delivery of energy to their customers. Assets are created through a set business processes that include capital investment planning and control. The process determines how capital investments will be prioritised and allocated on an annual basis to ensure that assets are created or enhanced in a sequence that serves the needs of the expanding cutomer base and provides acceptable financial returns to the utility company.

Prime Utility does not currently have a formal measurement program in place to provide information to decision makers. They have little information about how well capital investments are made and how well the overall process is managed and controlled.

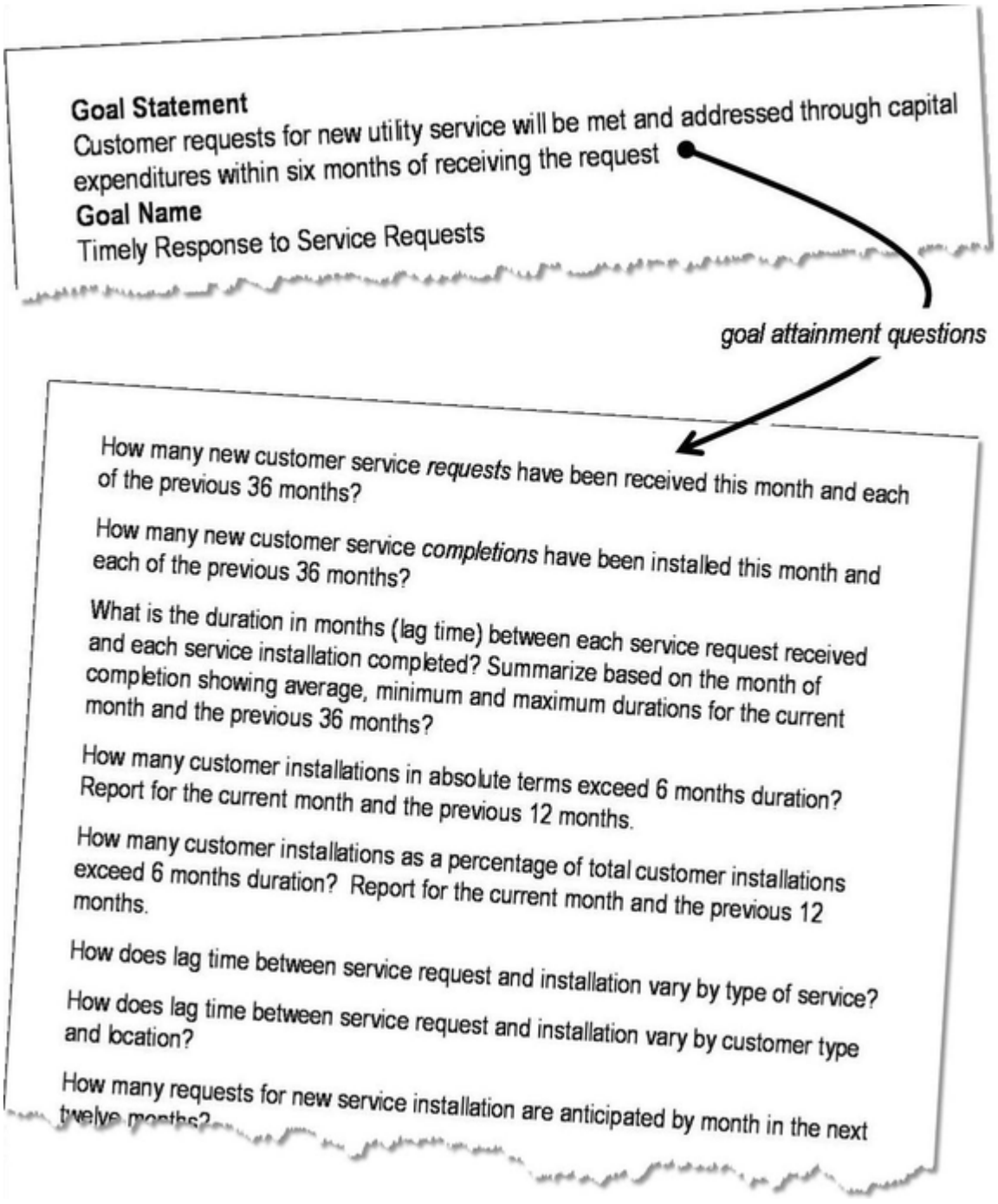
DRIVERS

The utility regulations currently governing Prime Utility are undergoing some significant changes. The current regulatory model permits Prime to recover all of its approved operating expenses and obtain a guaranteed rate of return on its current capital asset base. The value of the asset base is determined annually by considering depreciation of existing assets and investments in new assets. The current model does not encourage efficiency in terms of how capital is managed over the long term. Because Prime Utility provides a monopoly service, there is no real competition to provide alternative solution to its customers.

To improve the situation, the state regulatory agency is changing its regulatory model from cost-of-service basis to a performance-based model. The change is designed to promote efficiency into the capital management process and to provide a risk/reward model to Prime. The guaranteed rate of return will be removed and the company will be allowed to manage its capital with the potential of higher returns but also with the risk of lower returns.

GQMM Technique

Goal Attainment Questions



GQMM Technique

Goal Attainment Questions

PURPOSE

The second step in the GQMM technique identifies what business questions will be asked by various stakeholders at Prime Utility to monitor if progress is being made toward goal attainment and to detect if the goal is achieved. It will be the task of the metrics and measures to provide the information necessary to answer the questions.

UNDERSTANDING WHO IS ASKING THE QUESTIONS

It is important to identify the categories of stakeholders in the organization who have a direct or an indirect interest in knowing if a goal has been attained. At Prime Utility, the major categories of stakeholders are:

- Executive Team
- Customer Service Team
- Engineering, Operations and Construction Team

QUESTIONS

Questions asked by tactical teams:

1. How many new customer service *requests* have been received this month and each of the previous 36 months?
2. How many new customer service *completions* have been installed this month and each of the previous 36 months?
3. What is the duration in months (lag time) between each service request received and each service installation completed? Summarize based on the month of completion showing average, minimum and maximum durations for the current month and the previous 36 months?
4. How many requests for new service installation are anticipated by month in the next twelve months?

Question asked by the executive team:

5. How many customer installations in absolute terms exceed 6 months duration? Report for the current month and the previous 12 months.
6. How many customer installations as a percentage of total customer installations exceed 6 months duration? Report for the current month and the previous 12 months.
7. How does lag time between service request and installation vary by type of service?
8. How does lag time between service request and installation vary by customer type and location?

Module 5

Causal Modeling Case Study

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Case Study Background	5-2
Causal Modeling Approach	5-10
Model Validation	5-26

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Case Study Background

Business Perspective

How much to invest?

How to control budget variance?

How to allocate capital funds for the best ROI?

How to measure ROI of capital projects?

Develop the execution and management capability needed to control capital spending consistently across the organization …

Case Study Background

Business Perspective

INTRODUCTION

The case study presented in this module will be based on the same company example that was introduced in the previous module.

The background to the case study describes Prime Utility as a small regional electric and gas utility that is undergoing some fundamental changes in its business model that will impact its future financial performance. The details of the business model change were described in the previous module. The change is based on the regulatory model enforced by the state regulator that determines how rates are created, how costs are recovered and how much risk the utility is prepared to take on as it builds its infrastructure.

BUSINESS CHALLENGES

The new president at Prime Utility started his review of the organization's performance over the past five years to determine if there were any critical areas that required his attention in the short term. He reviewed staff levels, the technology landscape, financial performance, customer service, operations and corporate culture. He was surprised to learn that there was a fundamental weakness in the organization's ability to manage and execute capital projects. As part of his review, he determined that the processes related to setting investment priorities, capital budgeting, executing projects and measuring business benefits for the investments was an area of weakness.

He made the following key observations from his review.

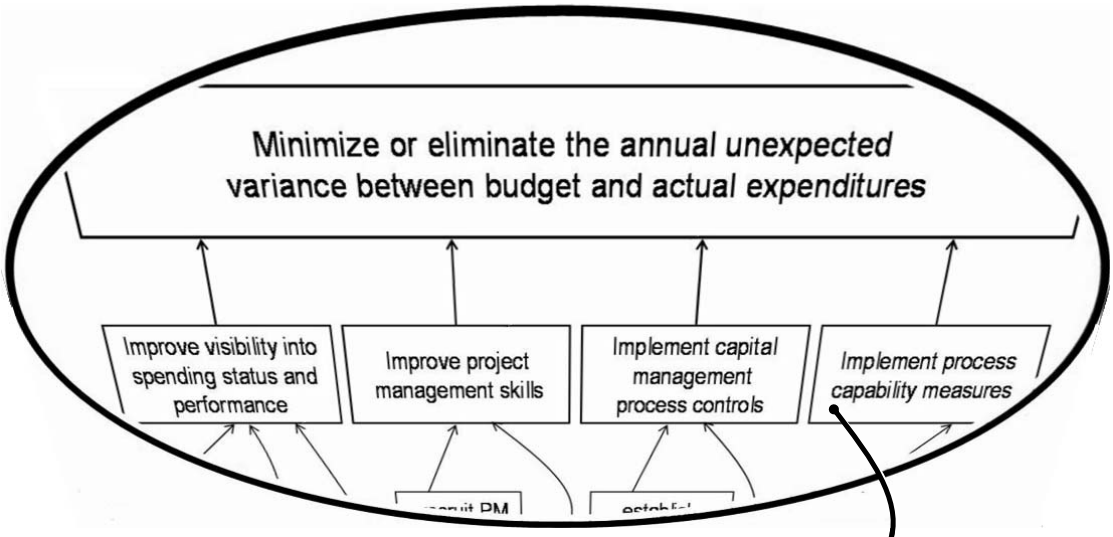
1. We don't seem to know how much we should be investing
2. We don't have the process capability to control our budgets to a reasonable variance.
3. We don't have the discipline in place to allocate our capital funds to those projects that will pay us the highest return.
4. We don't' really know how to measure the returns of our projects.

Recognizing that he cannot change everything at once he made the decision that the most critical area for improvement in the short term was the following:

Develop the execution and management capability needed to control capital spending consistently across the organization on an annual basis to the approved and acceptable level.

Causal Modeling Approach

Identifying Measures and Metrics – Goal #4



Implement Process Capability Measures

The overall capability to manage and control capital spending is based on understanding and managing detailed capabilities at the process-step level, requiring measurement at the planning, budgeting, spending, and project execution phases. Measurements are to be provided at each phase for each project semi-annually.

Metrics

- Number of capability metrics defined per lifecycle phase (minimum threshold = 4).
- Percent of defined capability metrics implemented and reporting data per lifecycle phase (target 75%)
- Percent of capability metrics implemented and reporting data per capital project (target 85%).

Measures

- Number of capability measures defined per lifecycle phase
- Number of capability metrics defined per lifecycle phase
- Number of capability measures implemented per lifecycle phase
- Number of capability metrics implemented per lifecycle phase
- Number of capability measures implemented per project
- Number of capability metrics implemented per project

GQMM

Causal Modeling Approach

Identifying Measures and Metrics – Goal #4

MEASURES AND METRICS TO MANAGE GOAL #4

Consider goal number 4, "Implement Process Capability Measurement Program" for the overall capital budget and project delivery process at Prime Utility.

This goal is renamed in an abbreviated form as "Implement Capability Measurements" and is related to providing reliable measurement information about the capability over time of Prime Utility to manage its capital budgets and projects. The goal is further described as

"The overall capability to manage and control capital spending is based on understanding and managing detailed capabilities at the process-step level, requiring measurement at the planning, budgeting, spending, and project execution phases. Measurements are to be provided at each phase for each project semi-annually."

The following measures were identified using the GQMM technique for the goal named "Implement Capability Measurements".

Measures

- No. of capability measures defined per lifecycle phase
- No. of capability metrics defined per lifecycle phase
- No. of capability measures implemented per lifecycle phase
- No. of capability metrics implemented per lifecycle phase
- No. of capability measures implemented per project
- No. of capability metrics implemented per project

The following metrics were identified to help Prime Utility manage and direct activities toward achieving this goal. The metrics were created from the base level measures and by assigning specific and measurable targets.

Metrics

- No. of Capability Metrics defined per lifecycle phase compared to a minimum threshold of 4.
- Percentage of defined Capability Metrics implemented and reporting data per lifecycle phase compared to a target of 75%
- Percentage of capability metrics implemented and reporting data per capital project compared to a target of 85%

Module 6

Summary and Conclusion

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Implementing and Sustaining Metrics	6-2
Summary of Key Concepts	6-6
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Summary of Key Concepts

A Quick Review

SOME KEY METRICS CONCEPTS

- Measures and metrics are not synonyms. Measures are the raw material from which metrics are derived.
- Effective metrics are purposeful and goal oriented.
- Metrics have four distinct components: quantum, subject, strata and application.
- Metrics are not isolated incidents. One metric may influence and be influenced by many others.
- Supply chain thinking helps to build, deliver and manage enterprise metrics.
- Cohesion and consistency of metrics is important to deliver high quality information.
- Data modeling is necessary but not sufficient for analysis and design of metrics.
- Cause and effect modeling is useful to define the right metrics.
- GQMM modeling is useful to design the right metrics and to define the right measures.
- Organization and culture are essential to successfully apply metrics.
- Portfolio management and change management are important for sustainable business metrics and analytics.

