Measuring Organizational Performance as a Result of Installing a New Information System: Using Concept Mapping as the Basis for Performance Measurement

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The Client: CITGO

- **Key Statistics:** Revenues: **$13 Billion**; Employees: **4,000**; Refinery Capacity: **1,073,000 BPD**.
- **Products & Services:**
  - produces and sells transportation fuels throughout the U.S. through branded marketers and distributors
  - produces and sells petrochemicals and industrial products in bulk to a variety of U.S. manufacturers as raw materials for finished goods
  - markets many different types, grades and container sizes of lubricant and wax products
  - produces and markets high quality asphalt
  - owns and operates a 959 mile crude oil pipeline system and three product pipelines with a combined total of approximately 1,100 miles

The Context

- Project E2000: Implementation of SAP computer system in all major divisions at CITGO
  - began in 1995
  - first project (Asphalt) “go live” date: 1/1/98
- The role of performance measurement
  - monitor post-implementation problems
  - identify areas for improvement in implementation
- Initial measurement system problems (Asphalt project)
  - focused on developing metrics rather than desired performance outcomes
  - inconsistent results across locations
  - too heavily based on perceptions
  - the measurement system wasn’t designed to meet all of the business requirements

The Light Oils Project

- Purpose: identify measures that would help CITGO track their “Go Live” readiness in the Light Oils division and their performance during the first 90 days of implementation
  - Minimize the performance dip that would inevitably occur with the introduction of a new system
- Start early enough to:
  - develop the measurement system
  - assign accountability for gathering measures
  - let users know how they would be measured before go live
- Start with business problem and performance objectives, *not* with metrics

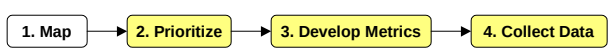
Steps and Tools

1. Map business performance objectives
2. Prioritize performance objectives
3. Develop and detail metrics
4. Collect data and utilize results

- Concept mapping (The Concept System®)
- Importance ratings (CS Global®)
- The CS Performer®
- The CS Performer®

1. Map Performance Objectives

- Focus: Describe specific human and business performance objectives for your area (or another area) of the business that will ensure a successful Light Oils implementation for CITGO.
- Participants
  - 16 core participant brainstorm and sort objectives
  - 42 participants rate objectives for relative importance
- Objectives: 124 performance objectives generated
- Tools
  - Brainstorming: The Concept System (group facilitated)
  - Sorting: The Concept System Remote on LAN
  - Rating: CS Global over Internet

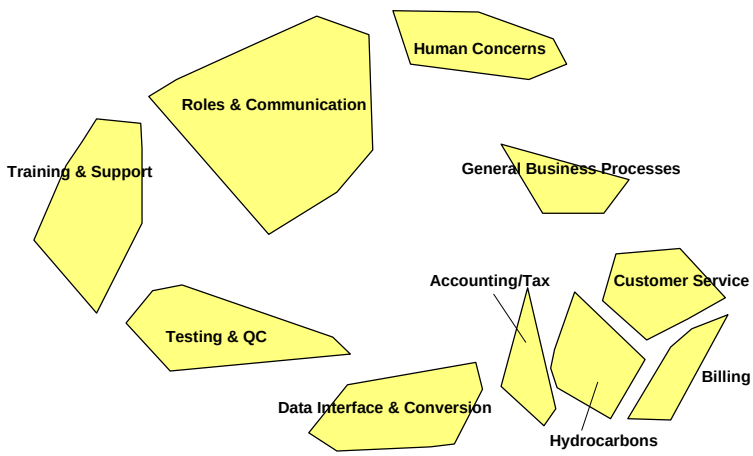


Sample Performance Objectives

- Complete successful system test & validation
- Train people only on those tasks which they will be responsible for
- Collect what you bill in a timely manner
- Ensure there is no impact or disruption to the current level of customer support
- Communicate changes to the invoice to customers
- Ensure correct customer master data (pricing, credit, tax, etc,)
- Individuals must understand the implications of not performing tasks correctly
- Communicate what roles individuals will be expected to perform
- Determine who has responsibility for performing each role
- Define any role changes that may be required
- Bill customers accurately
- Bill on timely basis
- Ensure help desk staff are sufficiently trained (SAP)
- Ensure business unit Power Users are fully trained
- Identify the Power Users in each business area
- Power Users need to demonstrate an understanding of the entire business process in their area of responsibility
- Power Users need to demonstrate expertise in SAP that supports their area of responsibility
- Give Power Users the appropriate time to be involved in testing
- Power users need to demonstrate an understanding of of special exceptions or unique situations that may arise
- ...

1. Map → 2. Prioritize → 3. Develop Metrics → 4. Collect Data

Performance Objectives Map



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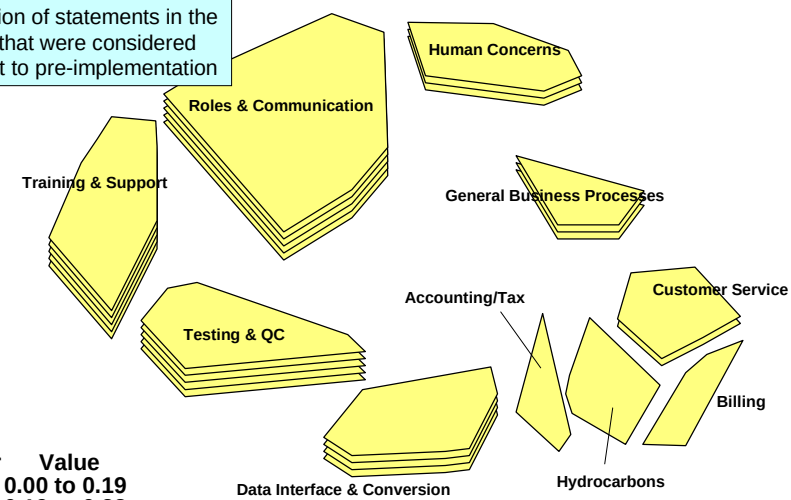
Pre-Post Implementation

The legend shows the proportion of statements in the cluster that were considered relevant to pre-implementation

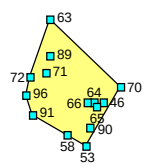


Layer	Value
1	0.00 to 0.19
2	0.19 to 0.38
3	0.38 to 0.58
4	0.58 to 0.77
5	0.77 to 0.96

1. Map → 2. Prioritize → 3. Develop Metrics → 4. Collect Data

Hydrocarbons Cluster

Report accurate bulk movements from carriers (e.g. pipelines, marine) (46)
Make sure suppliers know how to invoice us to get paid in a timely manner (53)
Make sure exchange balances are correct (58)
Make sure terminals don't run out of product (63)
Properly schedule production out of the refineries (64)
Properly schedule feed stocks into the refineries (65)
Properly schedule products into the terminals (66)
Guarantee sales dollars equal volume delivered times accurate price (70)
Make sure that billing delays do not impact demand planning (71)
Make sure that billing delays do not impact the allocations system (72)
Ensure vessels are available for charter (89)
Send out exchange statements in a timely manner (netting) (90)
Be able to keep CITGO inventory and 3rd party inventory separate (terminaling agreements, refinery processing agreements) (91)
Ensure that refinery production schedules come into TSW properly (96)



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2. Prioritize Performance Objectives

- Instruction:

  Rate each objective for how important it is for ensuring a successful Light Oils implementation for CITGO where:

  1 = relatively unimportant
  2 = somewhat important
  3 = moderately important
  4 = very important
  5 = extremely important

- 42 participants

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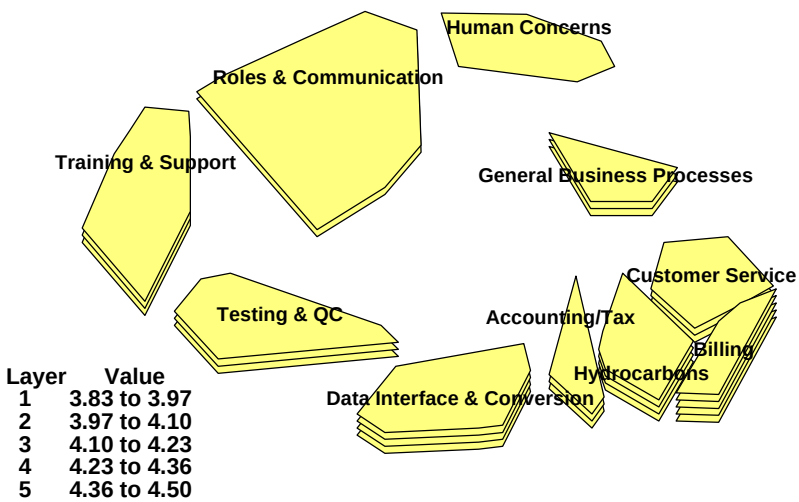
Importance Map



Layer	Value
1	3.83 to 3.97
2	3.97 to 4.10
3	4.10 to 4.23
4	4.23 to 4.36
5	4.36 to 4.50

1. Map → 2. Prioritize → 3. Develop Metrics → 4. Collect Data

3. Develop and Detail Metrics

- Five teams for metric development
  - based on performance objectives map
  - relevant knowledgeable stakeholders
- Process
  - review performance objectives in relevant clusters
  - brainstorm metric candidates
  - select final metrics
  - detail
    - » operational instruction
    - » target value
    - » low-high case
    - » frequency
    - » person/unit responsible
    - » follow-up metrics

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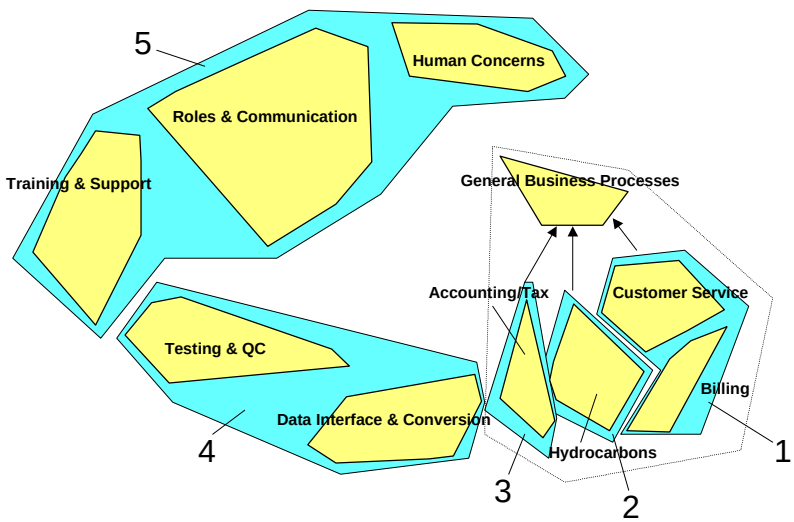
Metric Development Teams



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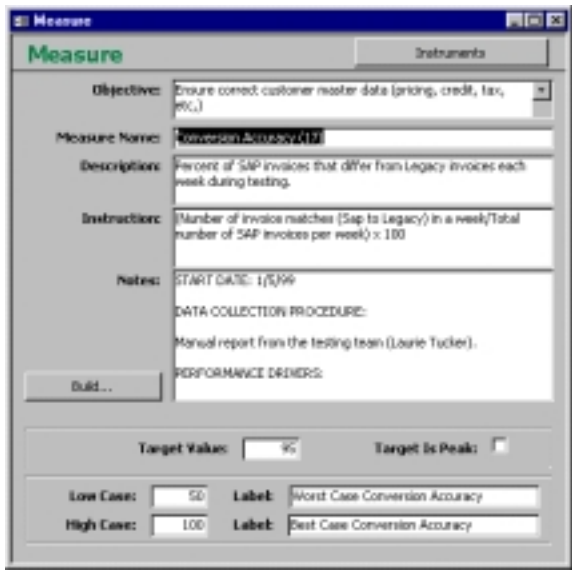
Entering Metric Data in CS Performer



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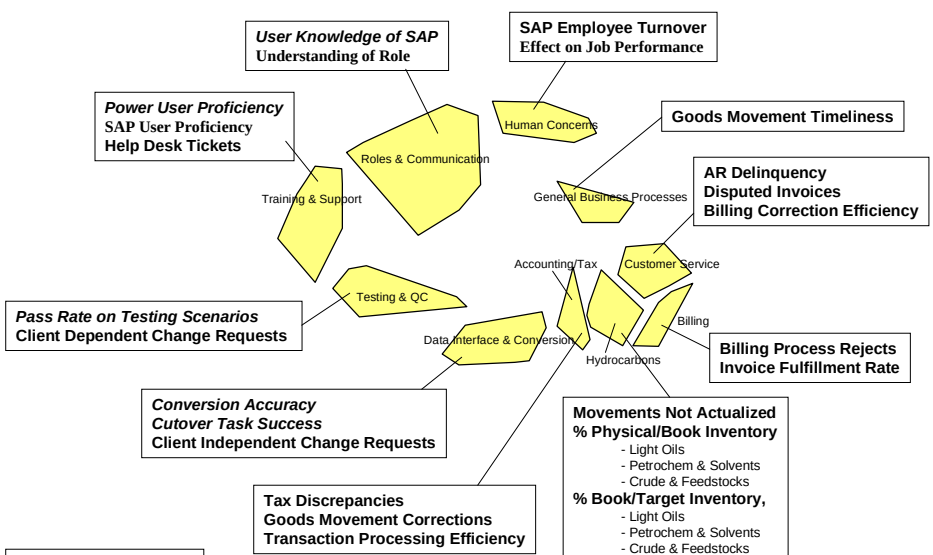
Final Performance Measures



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4. Collect Data and Utilize Results

- Enter data into CS Performer
- Compute standardized performance
- Display data
  - over time for each metric
  - at one time across metrics
- Identify performance problems
- Use follow-up metrics where needed to diagnose performance problems
- Intervene to improve performance

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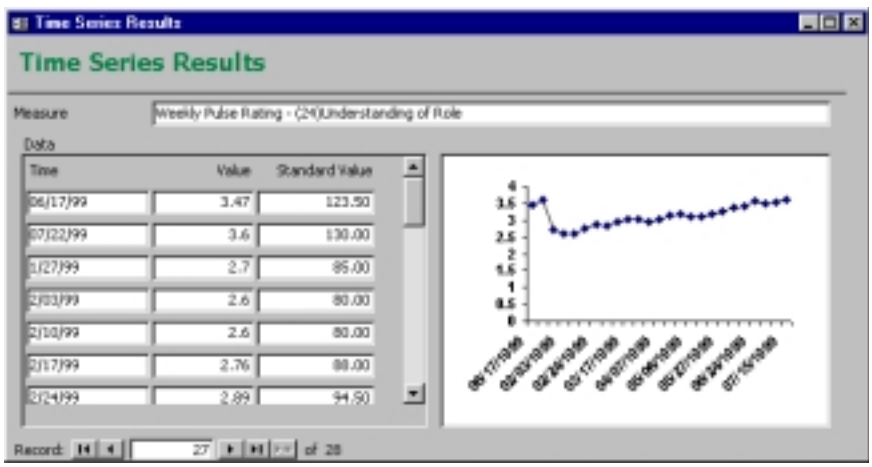
Sample Time Series Results



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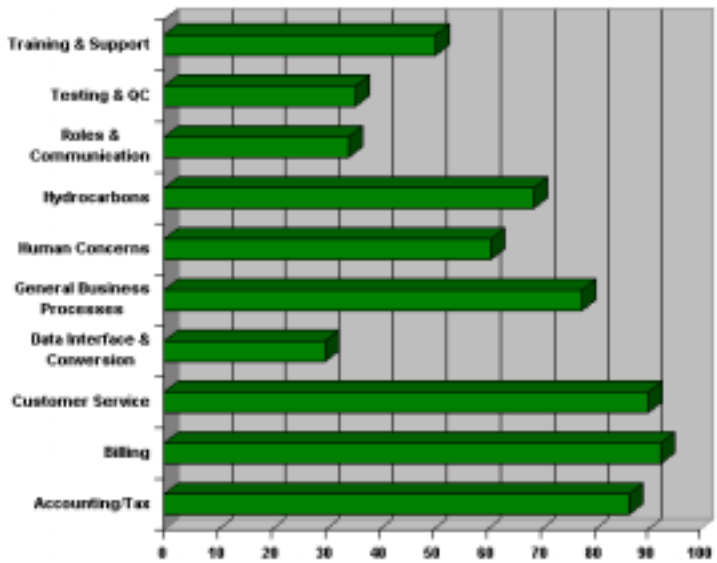
Sample Performance Results



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Conclusions

- **Gathers information from a virtually unlimited number of participants**
- **Graphically matches the opinions of various groups of stakeholders**
- **Provides a framework to articulate and discuss the measurement process**
- **Guides the organization through the measurement process**
- **Instills discipline to follow the process**
- **Provides a clearer picture of what people think**
- **Communicates ideas and builds consensus**
- **Measures performance over time**
- **Quantifies qualitative concepts**
- **Uses processes based on a statistical engine to produce results and generate a group map from the combined input of individuals in the group**